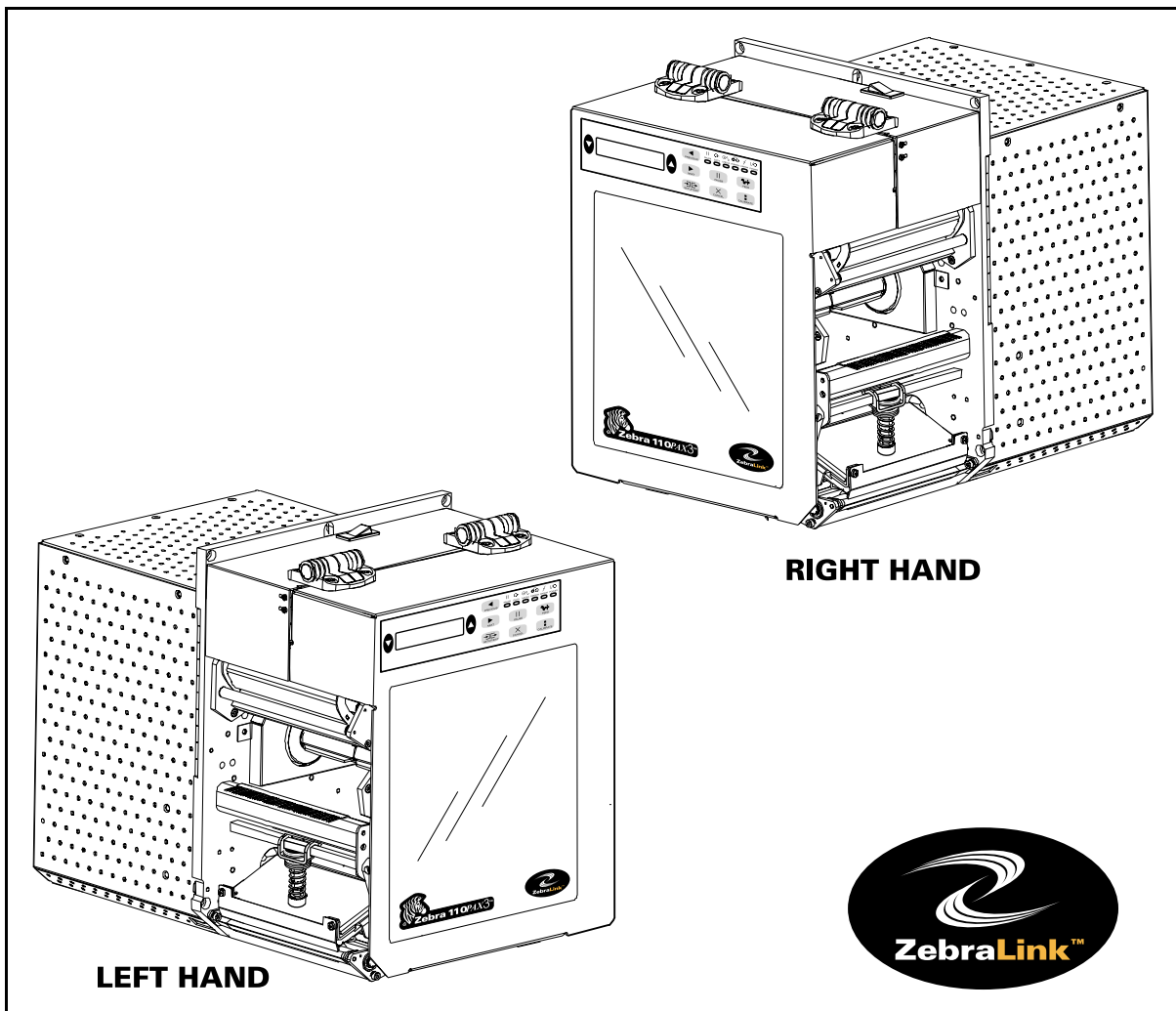


Zebra 116PAX3™ User's Guide



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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

To ensure compliance, this print engine must be used with a Shielded Power Cord and Shielded Communication Cables.

“The user is cautioned that any changes or modifications not expressly approved by Zebra Technologies Corporation could void the user’s authority to operate the equipment.”

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Introduction

Congratulations! You have just purchased a high-quality thermal demand print engine manufactured by the industry leader in quality, service, and value. For over 30 years, Zebra Technologies Corporation has provided customers the highest caliber of products and support.

To create and print label formats, refer to the *ZPL II Programming Guide* (part # 46530L). This guide is available by contacting your distributor or Zebra Technologies Corporation. It is also available as a file to download from Zebra's Web site: <http://support.zebra.com>. In addition, label preparation software is available. Contact your distributor or Zebra Technologies Corporation for further information.

The Zebra 116PAX3 Maintenance Manual (part # 43490L) contains the information you need to maintain the print engine properly.

Zebra 116PAX3 Print Engine

This user's guide contains information specific to the 116PAX3 (600 dot/inch) print engine manufactured by Zebra Technologies Corporation. The print engine is available in a right-hand configuration (media moves from left to right) and in a left-hand configuration (media moves from right to left).

Getting Started

Unpacking

Save the cartons and all packing materials in case shipping is required. If your print engine is equipped with the factory-installed remote front panel option, the front panel, mounting bracket, hardware, and instruction sheet are packaged in bubble wrap securely taped to the print engine. The interconnect cable is secured to a cardboard panel inside the outer box.

Inspect all components for possible shipping damage:

- Check all exterior surfaces for damage.
- Raise the front cover and inspect for damage.

Reporting Damage

If you discover shipping damage:

- Immediately notify the shipping company and file a damage report.
- Retain the carton and all packing material for inspection.
- Notify your local Zebra distributor of the damage.

Zebra Technologies Corporation is not responsible for any damage incurred during shipment of the print engine and will not cover the repair of this damage under its warranty policy. Any damage claim should be filed with the shipping company.

For shipping information, refer to "Shipping" on page 61.

Print Engine Mounting

For specific information on mounting the print engine into an applicator, refer to “Appendix B” on page 79.

Communications

Refer to Figure 1 on page 4. The 116*PAX3* print engine comes standard with both an Electronics Industries Association (EIA) RS-232 serial interface (DB-25 Connector) and an IEEE 1284 bi-directional parallel interface. The serial interface is also configured for both RS-422/RS-485 single drop and RS-485 multi-drop serial interfaces. Any of these four interface methods may be used to send commands and label formats from a host to the print engine.

A DB-15 Applicator Interface Connector provides communication between the print engine and the associated applicator hardware. In some applications, control signal timing may be a critical element in the performance of the print engine. Refer to “Appendix A” beginning on page 69 for control signal descriptions.

ZebraLink™ Real-Time Connectivity and Control Solution

ZebraLink is the advanced print engine management tool that enables real-time, remote error notification and systems control for OEMs, distributors, system integrators, and end-users. ZebraLink's combined components of WebView, Alert, and ZBI help address the growing need for networked equipment. Only ZebraLink gives you the power to control and monitor your print engines anytime, anywhere. Every ZebraLink print engine (just look for the ZebraLink logo), when used with ZebraLink-compatible network options, provides three core features:




- **WebView** (requires ZebraNet® PrintServer II) is the configuration component of ZebraLink, and enables networked users to control multiple functions of the printing process using any standard Web browser, such as Netscape Navigator or Internet Explorer. Users simply logon to the 116PAX3's print engine password-protected Web page via its IP address to view label formats, fonts, and graphics stored in memory, as well as to adjust common print engine settings such as darkness, media/ribbon sensor values, and applicator interface modes.
- The **Alert** feature (requires ZebraNet® PrintServer II) gives 116PAX3 print engines the voice to “talk back.” With ZebraLink, the print engines provide unsolicited communication to system administrators in real time. If a 116PAX3 print engine runs out of media or ribbon, it instantly notifies the user by issuing a detailed error message via e-mail to any text-capable, wired or wireless device, including pagers, cell phones, PDAs, and PCs. Notification directly from the print engine ensures the proper personnel are alerted immediately of an error condition so they can respond quickly and return the line to full operation.
- With **ZBI**, users familiar with ANSI BASIC programming language can easily program advanced applications within the 116PAX3's print engine, enabling it to accept and manipulate information from nearly any data source (PLCs, weigh scales, scanners, etc.), as well as to print the desired information on a label. Thus, the 116PAX3 print engine acts as the “brain” and creates true stand-alone applications using a scanner, keyboard, PLC, or weigh-scale as an I/O device, replacing the need for a dedicated computer terminal. ZBI controls and interprets incoming text and data streams, which permits the replacement of any brand of bar code print engines and printers with the superior performance and reliability of Zebra products, without costly label reformatting.



Equipped with 4 MB of RAM and 1.5 MB of non-volatile memory, the 600 dpi 116PAX3 print engine is capable of handling labels up to 33" (84 cm) long and can store complex label formats, fonts, and graphics. Print-and-apply systems with 116PAX3 print engines have the industry's most advanced monitoring and management tools available for any automated print-and-apply application. No other OEM print engines in the market offer this powerful combination.

If your print engine is equipped with the factory-installed remote front panel option, a DB-15 connector is supplied on the same bracket with the applicator interface for connection to the remote front panel.

 **NOTE:** With the exception of the optional remote front panel, you must supply all interface cables for your application. Refer to “Appendix A” beginning on page 69 for specific cable requirements.



CAUTION: Connecting a data communications cable while the power is ON may damage the 116PAX3 print engine.

Refer to Figure 7 on page 12 and ensure that the AC power ON/OFF switch is in the OFF (O) position. Ensure that power is off to the host and the applicator. Insert each connector fully and tighten all screws. When connecting a parallel interface cable, secure the cable to the print engine with the two clips on the connector.

Print Engine Power

The power supply in the 116PAX3 print engine automatically detects the applied line voltage and works in the 90 to 264 VAC, 48 to 62 Hz range.

Refer to Figure 1. The AC power cord must have a three-prong female connector on one end that plugs into the mating connector at the rear of the print engine. If a power cord was not included with your print engine, refer to “Appendix A” beginning on page 69.



WARNING: For personnel and equipment safety, always use a three-prong plug with an earth-ground connection to the AC power source.

Refer to Figure 7 on page 12 and ensure that the AC power ON/OFF switch is in the OFF (O) position before connecting the AC power cord to a nearby electrical outlet.

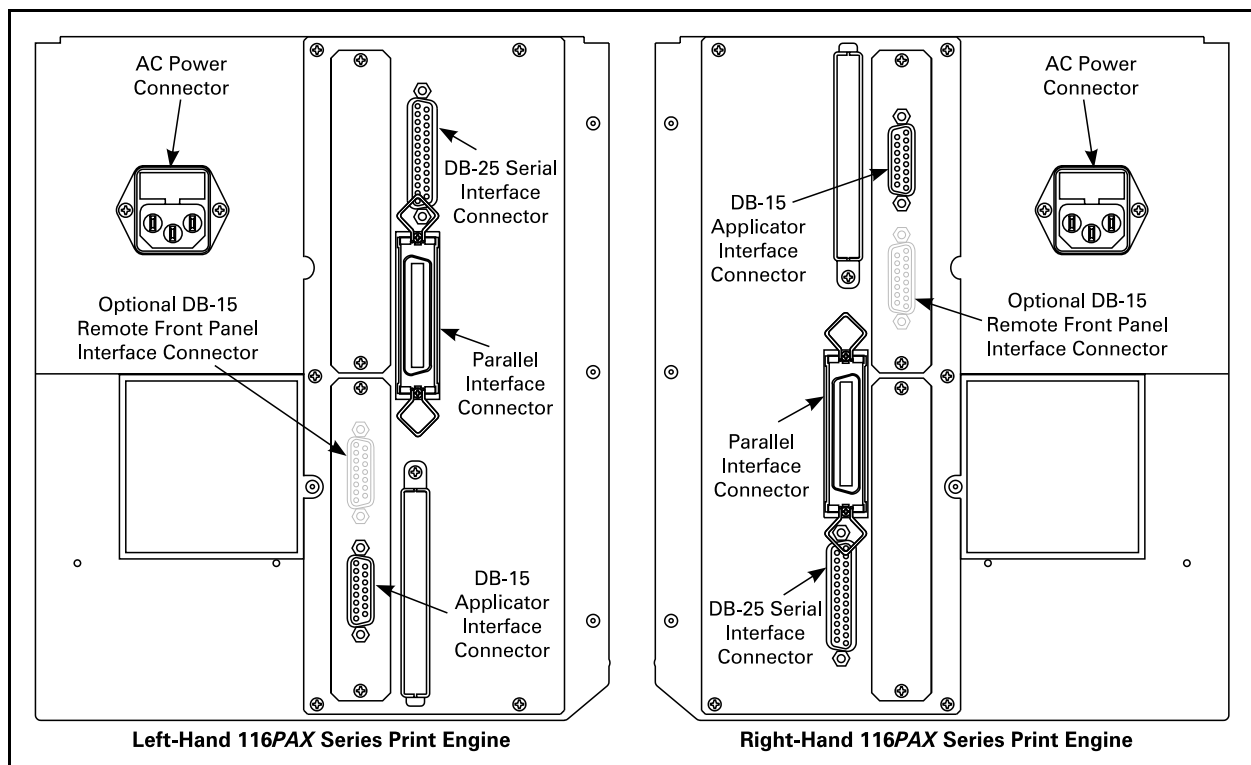


Figure 1. Power and Cable Connections

Media & Ribbon Loading

Media Loading

If your print engine is a right-hand unit (printed labels are presented on the right-hand side of the unit), refer to Figure 2 while performing the following procedure. If your print engine is a left-hand configuration (printed labels are presented on the left-hand side of the unit), refer to Figure 3.

1. Load the media on the media supply reel of the applicator (refer to the applicator's user's manual).
2. Grasp the outer media edge guide (A) and slide it as far out from the print engine frame as possible.
3. Open the printhead assembly (B) by unlatching the printhead latch (C) from the locking pin (D).
4. Press the release button (E) on the segmented pinch roller assembly (F) and allow the assembly to pivot up.
5. Thread the media under the upper guide post (G), between the rubber pinch roller and the associated roller in the segmented pinch roller assembly (F), and under the printhead assembly (B) until approximately 30" (75 cm) of media extends out of the print engine. Remove the labels from the exposed media.

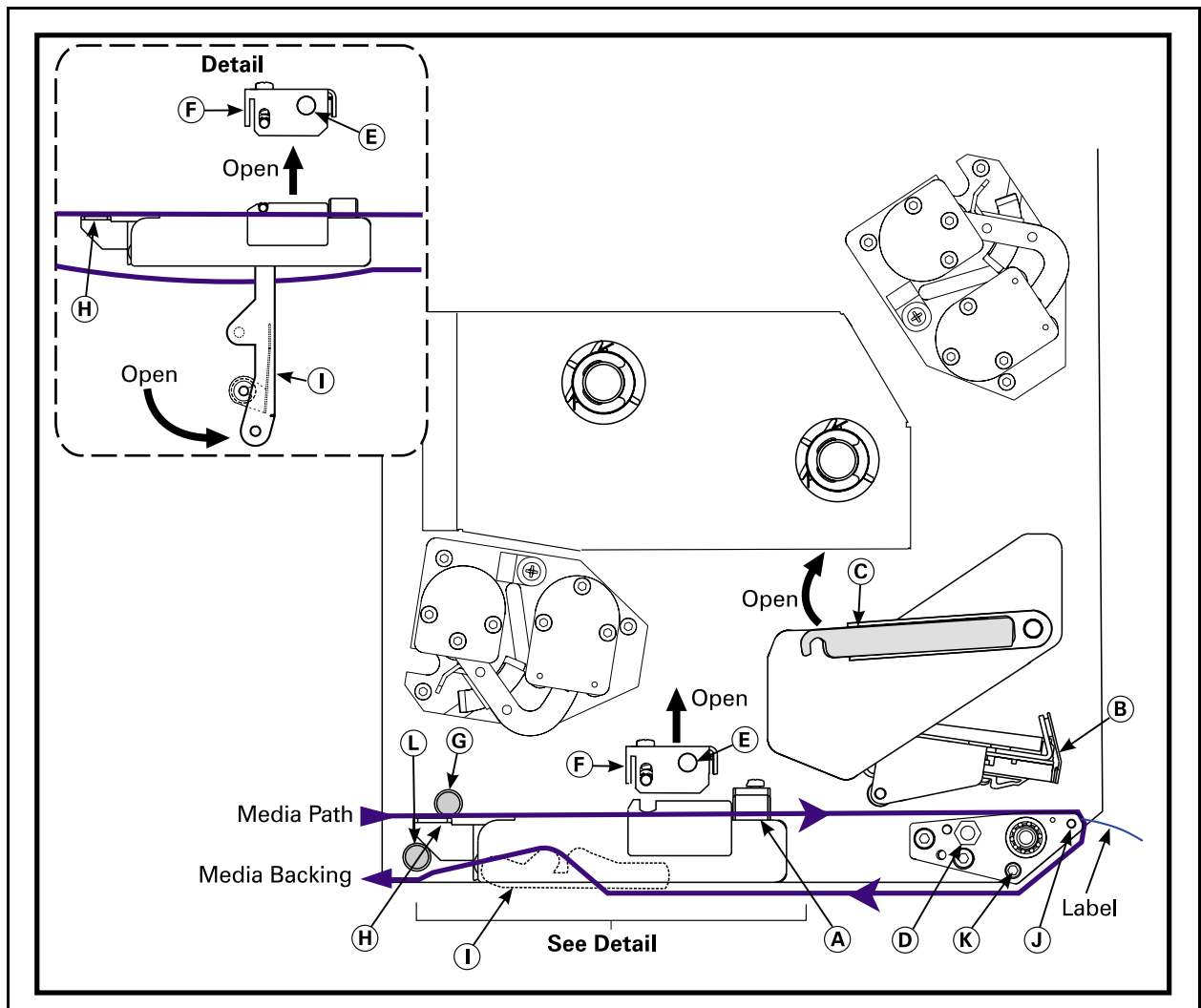



Figure 2. Media Loading (RH)

6. Ensure the media is aligned to the stationary inner media edge guide and the indicator on the peel bar.
7. Close the printhead assembly (B) by rotating the printhead latch (C) until it latches onto the locking pin (D).
8. Press down on the pivoting segmented pinch roller assembly (F) until it locks closed.
9. Position the outer media edge guide (A) so it just touches the outer edge of the media.
10. Raise the peel roller latch (H) so the peel roller assembly (I) pivots down to a vertical position.
11. Thread the media liner around the peel bar (J), under the lower media liner roller (K), and through the peel roller assembly (I). (See Detail.)

 **NOTE:** If the applicator has an air tube, route the media liner between the air tube and the peel bar. Do not thread the media liner over this tube!

12. Rotate the peel roller assembly (I) up until it locks into the closed position.
13. Thread the media liner under the lower guide post (L) and around the take-up spindle of the applicator (refer to the applicator's user's manual).

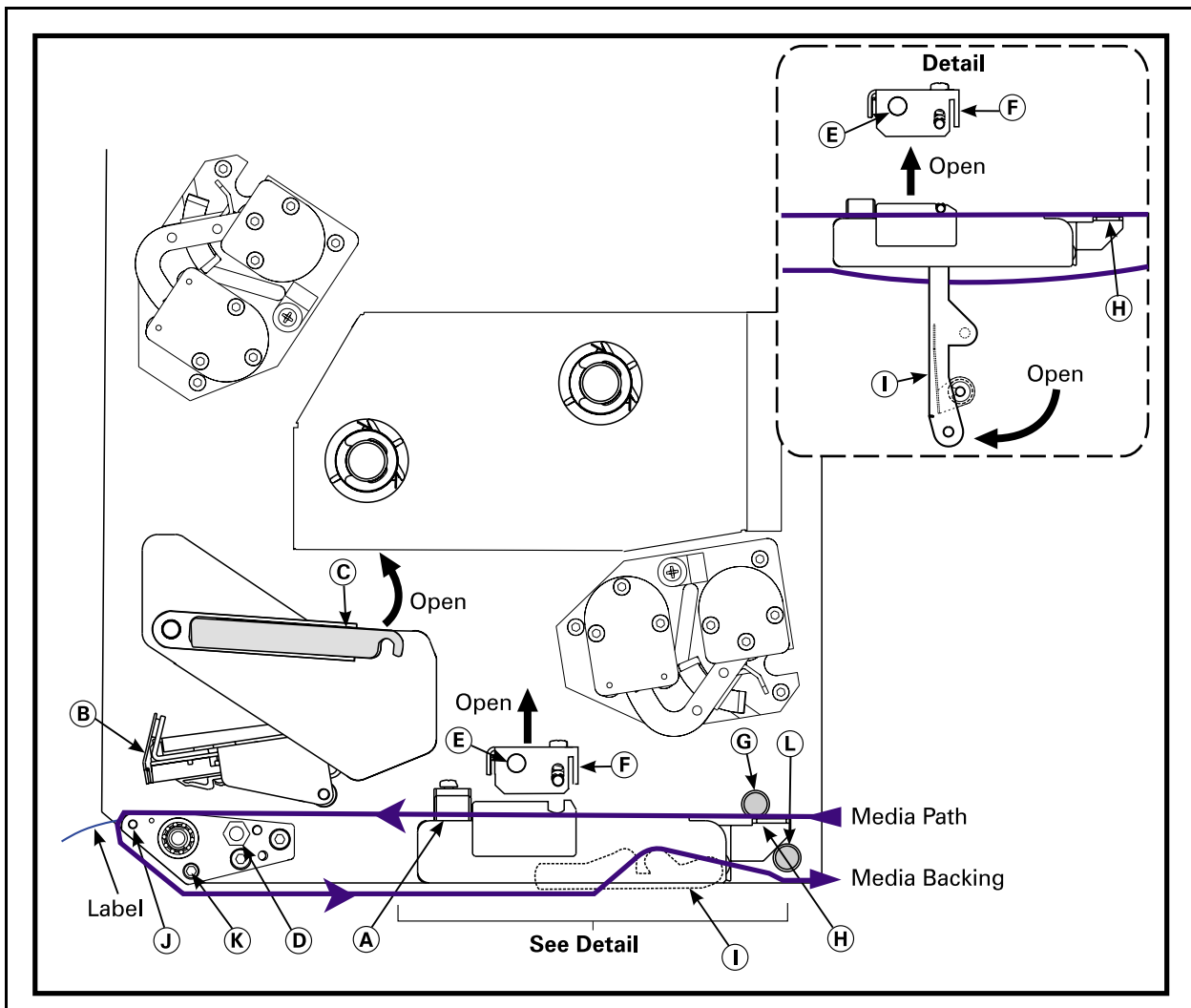


Figure 3. Media Loading (LH)

Ribbon Loading

To load ribbon, refer to Figure 4 (for right-hand units) or Figure 5 (for left-hand units).



NOTE: Do not load ribbon if the print engine is to be used in the direct thermal mode.



CAUTION: When installing the ribbon roll on the ribbon supply spindle, ensure that it is fully seated and that the ribbon is aligned squarely with its core. **Do not** use ribbon that is narrower than the media. If the printhead is not protected by the smooth liner of the ribbon, premature printhead failure may result due to excessive abrasion.

1. Install the ribbon roll onto the supply spindle (M) and push it on until it is fully seated, so the ribbon feeds as shown in Figure 4 for right-hand units or Figure 5 for left-hand units. Ensure that the ribbon core fits tightly to the spindle. If the core is not tight, proper ribbon tension may not be maintained.
2. Install an empty ribbon core onto the ribbon take-up spindle (N) and push it on until it is fully seated. Ensure that the ribbon core fits tightly to the spindle.
3. Open the printhead assembly (B) by unlatching the printhead latch (C) from the locking pin (D).
4. Using your thumb and the side of your index finger, squeeze the ribbon supply dancer arm opening tab (O) toward the outer U-shaped channel and pivot open the dancer arm. Carefully thread the ribbon between the two U-shaped channels, and then slowly release the ribbon supply dancer arm.
5. Thread the ribbon under the printhead assembly (B) and then up toward the ribbon take-up dancer assembly.

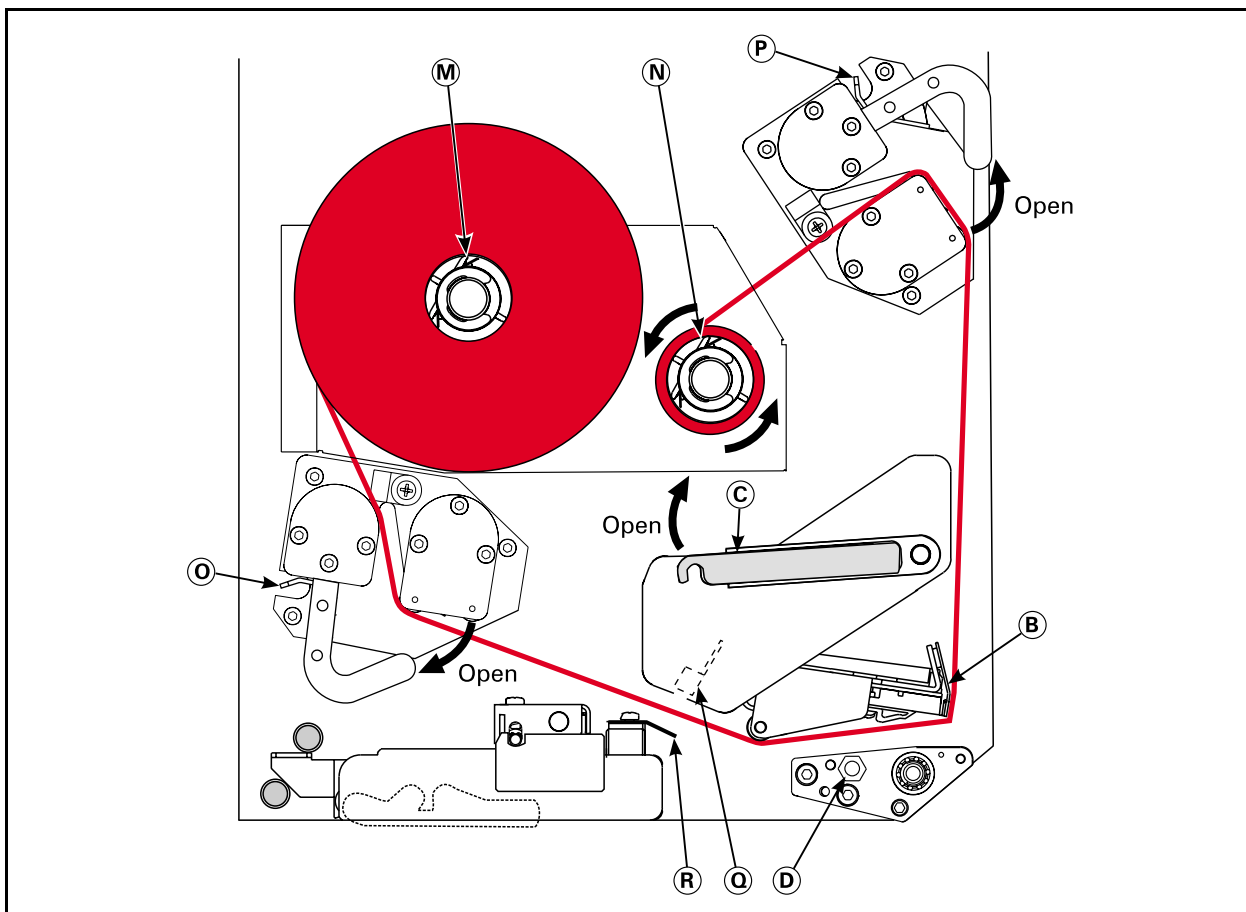


Figure 4. Ribbon Loading (RH)

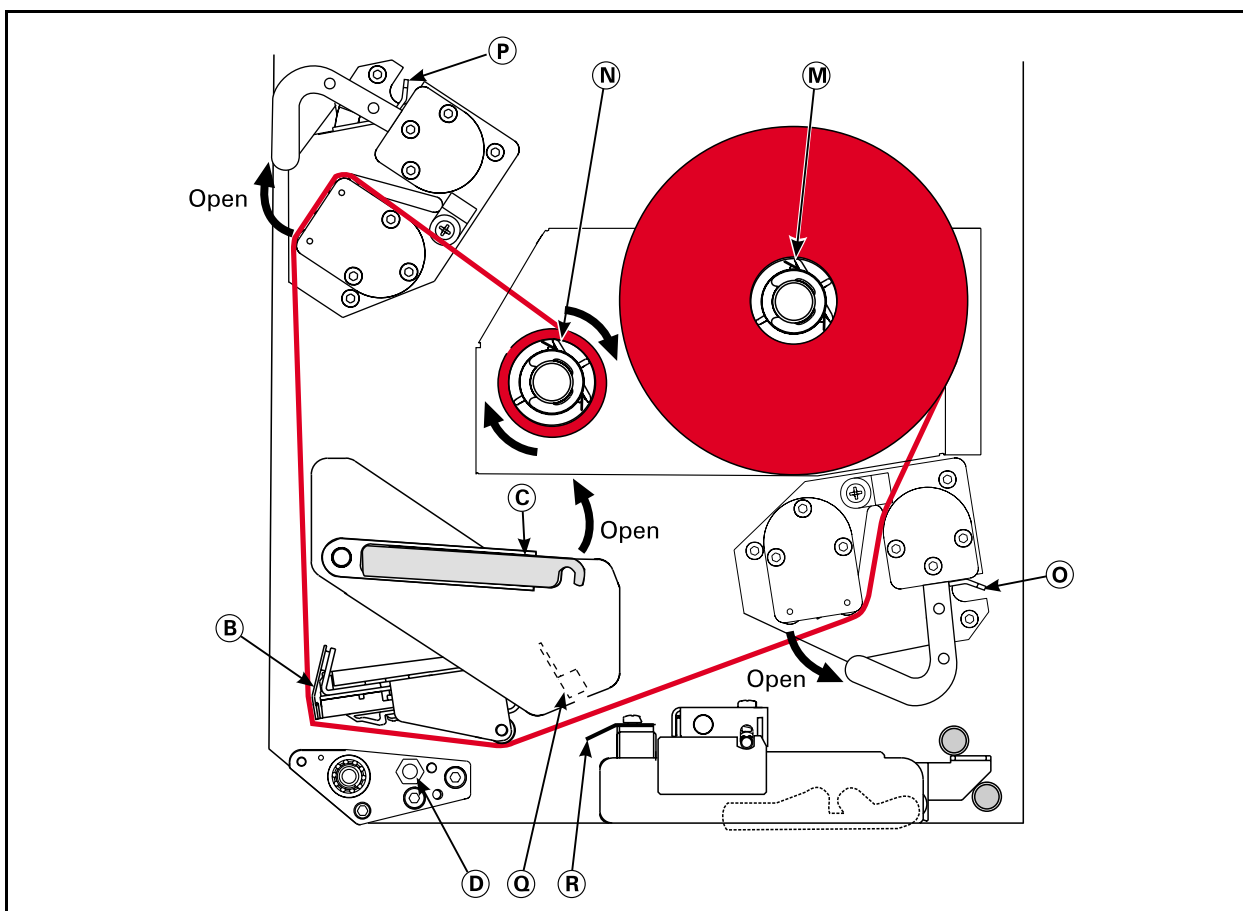


Figure 5. Ribbon Loading (LH)

6. Using your thumb and the side of your index finger, squeeze the dancer arm opening tab (P) toward the inner U-shaped channel and pivot open the dancer arm. Carefully thread the ribbon between the two U-shaped channels, and then slowly release the dancer arm.
7. Attach the ribbon to the take-up spindle core (use a label if needed) and wind for several turns in the direction shown in the illustration. Make sure the ribbon winds evenly on the spindle to prevent the possibility of the ribbon telescoping.
8. Close the printhead assembly (B) by pivoting the printhead latch (C) onto the locking pin (D).
9. Ensure the ribbon is routed properly in both ribbon dancer assemblies and between the ribbon sensor (Q) and the ribbon sensor reflector (R) positioned below it.

Removing Used Ribbon

To remove used ribbon, refer to Figure 4 (for right-hand units) or Figure 5 (for left-hand units):

1. Open the printhead assembly (B) by unlatching the printhead latch (C) from the locking pin (D).
2. If the ribbon is not completely exhausted, wind the remaining ribbon onto the take-up spindle (N), or cut the ribbon between the take-up spindle and the ribbon take-up dancer assembly.
3. Remove the ribbon, complete with the core, from the ribbon take-up spindle.
4. Remove the supply ribbon core from the ribbon supply spindle (M).
5. Load the new ribbon as explained on page 7.

Media Sensor Position

Reflective Media Sensor

Some types of media have black marks printed on the underside of the media liner that act as “Start of Label” indicators. The reflective media sensor senses these black marks. The position of this sensor is not adjustable. If you use this type of media, refer to “Media Specifications” on page 58 for information about black mark requirements.

Transmissive Media Sensor

The transmissive media sensor finds “Start of Label” indicators such as a notch or hole in the media or an interlabel gap between labels. This sensor consists of a light source (positioned below the media) and a light sensor (positioned above the media). To position this sensor, refer to Figure 6. If the media has a notch or hole, slide the sensor position indicator (Q) along the pivoting segmented pinch roller assembly (F) so the point of the indicator aligns with the notch or hole in the media. If your media uses an interlabel gap, position the media sensor approximately at the center of the media width.

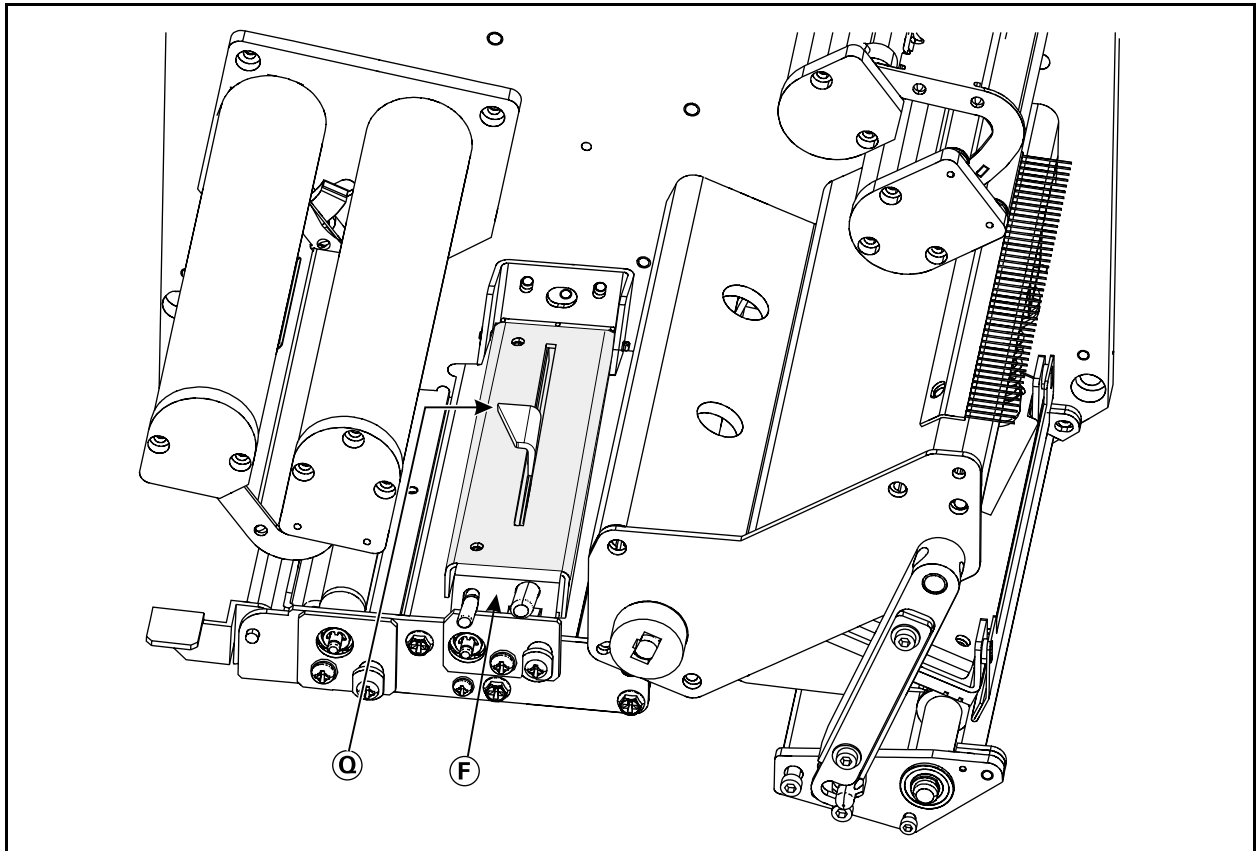


Figure 6. Media Sensor Adjustment (RH)



Print Engine Operation

Power On/Off Switch

The Power On/Off Switch is located on the top of the print engine housing, as shown in Figure 7. When this switch is placed in the ON (|) position, the POWER light turns ON and the print engine automatically performs a Power-On Self Test (POST). The Liquid Crystal Display (LCD) validates the steps in the self test.



NOTE: Refer to “Troubleshooting” beginning on page 45 if the print engine stops due to failing a test in the POST.

Front Panel Keys

All controls for the print engine are located on the front panel. If your print engine is equipped with the factory-installed remote front panel option, the front panel is absent from the front of the print engine and all controls are located on the remote front panel.

Four keys are used to control the various print engine operations:

FEED Key—If you press the FEED key while the print engine is idle or paused, a blank label is fed immediately. If you press the FEED key while the print engine is printing, one blank label is fed after the completion of the current batch of labels. Once the blank label has been fed, pressing the FEED key again feeds a second label.

PAUSE Key—The PAUSE key stops and restarts the printing process. When the print engine is paused, the PAUSE light is ON. The first time you press the PAUSE key, any partially printed label is completed, then the printing process is stopped. If the print engine is idle when you press the PAUSE key, no new print requests are accepted. Press the PAUSE key a second time to resume the printing process.

The PAUSE mode can also be activated/deactivated through pin 5 of the Applicator Port or by sending a ZPL II[®] command to the print engine.

CANCEL Key—The CANCEL key functions only when the print engine is paused. When you press the CANCEL key, the label format that is currently printing is canceled. If no label format is printing, then the next one to be printed is canceled. If there are no label formats stored in the print engine waiting to be printed, the CANCEL key is ignored. *To clear the print engine’s entire label format memory, press and hold this key for several seconds until the DATA light turns OFF. The print engine discards all of the label format data it has received and returns to the idle state.*

CALIBRATE Key—The CALIBRATE key functions only in the PAUSE mode. Press once to recalibrate for proper media length, set media type (continuous/non-continuous), and set print method (direct thermal/thermal transfer).

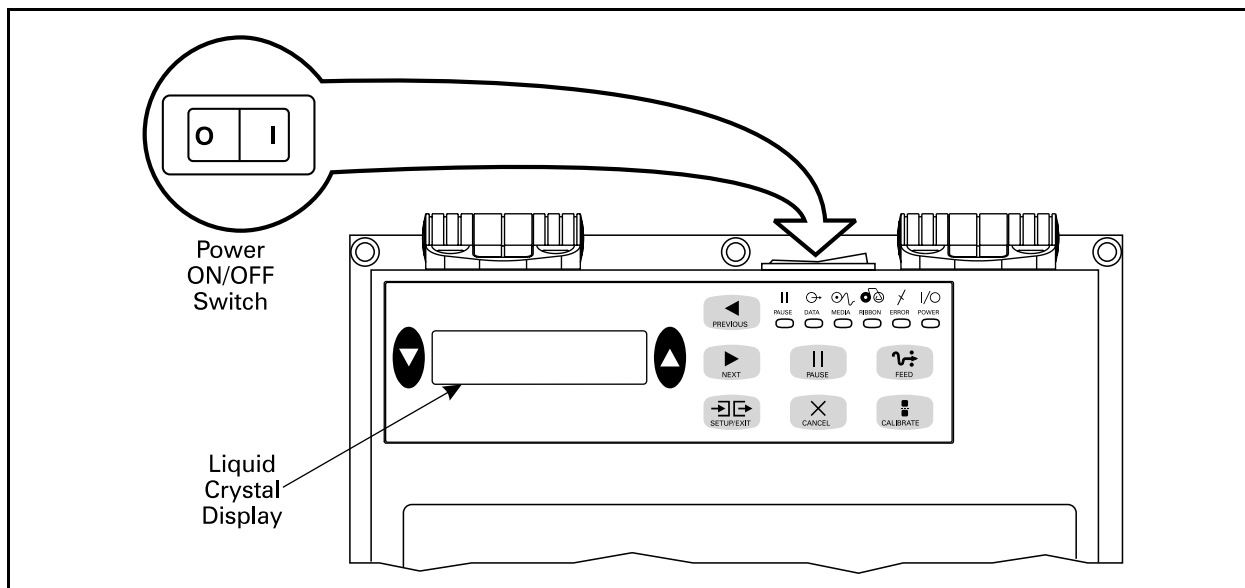


Figure 7. Control Panel

Liquid Crystal Display (LCD)

The control panel shown in Figure 7 contains a backlit LCD. It shows operational status as well as setup modes and feature parameters.

Control Panel Keys

Five keys are used to set print and communication parameters:

BLACK OVAL KEYS—These two keys are used to change parameter values depending on the parameter being displayed. Common uses include increasing or decreasing a value, answering yes or no, indicating ON or OFF, and scrolling through several choices.

PREVIOUS—Scrolls the display to the previous parameter.

NEXT—Scrolls the display to the next parameter.

SETUP/EXIT—Enters and exits the setup mode.

Specific uses of these keys are explained with each parameter setting description in “Configuration” beginning on page 15.

Front Panel Indicator Lights (LEDs)


LEDs on the front panel are a quick indication of the print engine's status.

LED	OFF	ON	FLASHING
POWER (Green)	Print engine OFF or no power to print engine.	Power switch is ON and power is being supplied to print engine.	—
PAUSE (Yellow)	Normal operation.	Print engine is paused (Printhead, ribbon, or paper error detected. or PAUSE key was pressed. or A pause was requested from the Applicator Port. or A pause was received as part of the label format).	—
DATA (Green)	No data being received or processed.	Data processing or printing taking place.	Print engine is receiving data from or sending status information to the host computer. Flashing slows when the print engine cannot accept more data, but returns to normal once data is again being received.
MEDIA (Yellow)	Normal operation. Media properly loaded.	Out of media. (Print engine is paused, LCD displays error message, and PAUSE light is ON).	—
RIBBON (Yellow)	Normal operation. Ribbon properly loaded.	Ribbon in (print engine is in direct thermal mode) or no ribbon loaded (print engine is in thermal transfer mode). Print engine is paused, LCD displays error message, and PAUSE light is ON.	—
ERROR (Orange)	No print engine errors.	—	Print engine error exists. Check LCD for status.



Configuration

After you have installed the media and ribbon and the Power-On Self Test (POST) is complete, the LCD shows “PRINTER READY.” (If the print engine fails its POST, refer to page 45.) You may now set print engine parameters for your application using the front panel display and the five keys directly below it.


 **NOTE:** Print engines that are operating on an IP network can be quickly configured using ZebraNet® WebView (optional ZebraNet® PrintServer II required). For information, refer to *ZebraNet Networking: PrintServer II Installation and User's Guide*.

If it becomes necessary to restore the initial print engine defaults, see “FEED Key and PAUSE Key Self Test” on page 53.

Entering the Setup Mode

To enter the setup mode, press the SETUP/EXIT key.

Press either the NEXT key or PREVIOUS key to scroll to the parameter you wish to set.

 **NOTE:** You may also press and hold the NEXT and PREVIOUS keys to advance quickly through the configuration parameters.

Parameters in this section are shown in the order displayed when pressing the NEXT key. Throughout this process, press the NEXT key to continue to the next parameter, or press the PREVIOUS key to return to the previous parameter in the cycle.

An asterisk (*) in the upper left-hand corner of the LCD indicates that the value displayed is different from the currently stored value.

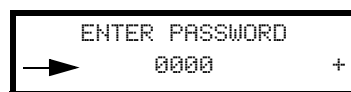
Changing Password-Protected Parameters

Certain parameters, indicated by an illustration of a key  after the title, are password protected by factory default.



CAUTION: Do not change password-protected parameters unless you have a complete understanding of what you are doing! If the parameters are set incorrectly, they could cause the print engine to function in an unpredictable way.


The first attempt to change one of these parameters (pressing one of the BLACK OVAL keys) requires you to enter a four-digit password. This is done via the “ENTER PASSWORD” display.



The LEFT BLACK OVAL key changes the selected digit positions, and the RIGHT BLACK OVAL key increases the selected digit value. After entering the password, press the NEXT key. The parameter you wish to change is displayed. If the password was entered correctly, you can now change the value.

The default password value is 1234. The password can be changed using the **^KP** (Define Password) ZPL II instruction or through ZebraNet® WebView (optional ZebraNet® PrintServer II required).

 **NOTE:** Once the password has been entered correctly, it does not have to be entered again unless you leave and re-enter the setup mode using the SETUP/EXIT key.

 **NOTE:** You can disable the password protection feature so that it no longer prompts you for a password by setting the password to 0000 using the ^KP0 ZPL/ZPL II command. To re-enable the password-protection feature, send the ZPL/ZPL II command ^KPx, where “x” can be any number, one to four digits in length, except 0.

Leaving the Setup Mode

You can leave the setup mode at any time by pressing the SETUP/EXIT key. The “SAVE CHANGES” display appears.




There are five choices described below. Pressing the LEFT or RIGHT BLACK OVAL key displays other choices, and pressing the NEXT key selects the displayed choice.

PERMANENT—Permanently saves the changes. Values are stored in the print engine even when power is turned off.

TEMPORARY—Saves the new changes until they are changed again or until power is turned off.

CANCEL—Cancels all changes since pressing the SETUP/EXIT key except the darkness and tear-off settings (if they were changed).

LOAD DEFAULTS—Loads factory defaults as the print engine’s operating parameters. The factory defaults are shown on the following pages.

 **NOTE:** Loading factory defaults requires that a new print engine calibration be performed, which resets printhead resistance and applicator port values.







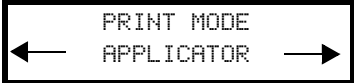
LOAD LAST SAVE—Reloads values from the last permanent save as the print engine’s operating parameters.


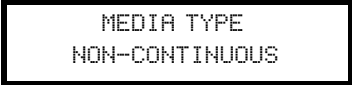



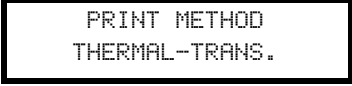
Configuration and Calibration Sequence


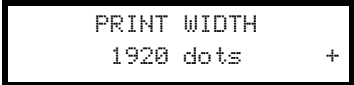


The configuration parameters are shown in the order they are displayed when the NEXT key is pressed. Press the NEXT key to move to the next parameter or the PREVIOUS key to return to the previous parameter in the cycle. When a parameter is changed, an asterisk (*) is shown in the upper left corner of the LCD to indicate that the value is different from the one currently active in the print engine.


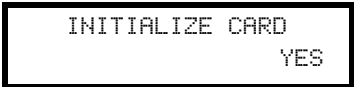



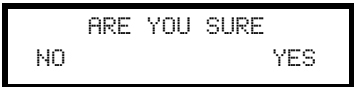

If you want the prompts shown in a language other than English, press the PREVIOUS key to select the desired language. Exit the setup mode, save permanent, and re-enter the setup mode. The LCD now uses the selected language.

Setting Print Parameters

Press	LCD Shows	Action/Explanation
—		Normal print engine operation.
Setting Print Parameters		
		<p>Adjusting Print Darkness: Press the RIGHT BLACK OVAL key to increase darkness. Press the LEFT BLACK OVAL key to decrease darkness.</p> <p>Default: 4.0</p> <p>Range: 0.0 to +30.0</p> <p>Darkness (burn duration) settings are dependent on a variety of factors, including ribbon type, media, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing.</p> <p>If printing is too light, or if there are voids in printed areas, you should increase the darkness. If printing is too dark, or if there is spreading or bleeding of printed areas, you should decrease the darkness.</p> <p>The FEED Key Self Test on page 52 also can be used to determine the best darkness setting. Since the darkness setting takes effect immediately, you can see the results on labels that are currently printing.</p> <p>CAUTION: Set the darkness to the lowest setting that provides good print quality. Darkness set too high may cause ink smearing and/or it may burn through the ribbon.</p> <p><i>Darkness settings also may be changed by the driver or software settings.</i></p>
		<p>Adjusting the Tear-Off Position: Press the RIGHT BLACK OVAL key to increase the value; press the LEFT BLACK OVAL key to decrease the value. Each press of the key adjusts the tear-off position by four dot rows.</p> <p>Default: +0</p> <p>Range: -120 to +120</p> <p>This parameter establishes the position of the media over the tear-off/peel-off bar after printing so the label and liner can be torn off. Positive numbers move the media out, negative numbers move the media in.</p>
		<p>Selecting Print Mode: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Applicator</p> <p>Selections: Tear-off, rewind, applicator</p> <p>Print mode settings tell the print engine the method of media delivery that you wish to use.</p>

Press	LCD Shows	Action/Explanation
		<p>Setting Media Type: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Non-continuous</p> <p>Selections: Continuous, non-continuous</p> <p>This parameter tells the print engine the type of media you are using. Selecting continuous media requires that you include a label length instruction in your label format (^Lxxxx if you are using ZPL or ZPL II).</p> <p>When non-continuous media is selected, the print engine feeds media to calculate label length (the distance between two detections of the inter-label gap, webbing, or alignment notch or hole).</p>
		<p>Setting the Sensor Type: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Web</p> <p>Selections: Web, mark</p> <p>This parameter tells the print engine whether you are using media with a web (gap/space between labels, notch, or hole) to indicate the separations between labels or if you are using media with a black mark printed on the back. If your media does not have black marks on the back, leave your print engine at the default (web).</p>
		<p>Selecting Print Method: Press the RIGHT BLACK OVAL key for the next value; press the LEFT BLACK OVAL key for the previous value.</p> <p>Default: Thermal transfer</p> <p>Selections: Thermal transfer, direct thermal</p> <p>The print method parameter tells the print engine the method of printing you wish to use: direct thermal (no ribbon) or thermal transfer (using thermal transfer media and ribbon).</p> <p>NOTE: Selecting direct thermal when using thermal transfer media and ribbon creates a warning condition, but printing continues. Verify that the ribbon is correctly installed for Thermal Transfer, and not installed for Direct Thermal.</p>

Press	LCD Shows	Action/Explanation
		<p>Setting Print Width: Press the RIGHT BLACK OVAL key to increase the value; press the LEFT BLACK OVAL key to decrease the value. To change the unit of measurement, press the LEFT BLACK OVAL key until the unit of measurement is active, then press the RIGHT BLACK OVAL key to toggle to a different unit of measure (inches, mm, or dots).</p> <p>Default: 1920 dots</p> <p>Print width determines the printable area across the width of the label given the resolution of the print engine.</p> <p>NOTE: Setting the width too narrow can result in portions of the label not being printed on the label material. Setting the width too wide wastes formatting memory and can cause printing off the label and on the platen. This setting can affect the horizontal position of the label format if the image was inverted using the ^POI ZPL II command.</p>
		<p>Setting Maximum Label Length: Press the LEFT BLACK OVAL key to decrease the value; press the RIGHT BLACK OVAL key to increase the value.</p> <p>Default: 33.0 in. (838 mm)</p> <p>Range: Values are adjustable in one-inch (25.4 mm) increments. Maximum length is used in conjunction with the calibration procedure. The value of this setting determines the maximum label length that is used during the media portion of the calibration process. Only a few labels are required to set media sensors. The interlabel gap is considered part of the label length and must be taken into consideration. Always set the value that is closest to, but not less than, the length of the label you are using. For example, if the length of the label is 5 in. (126 mm) including the interlabel gap, set the parameter for 6.0 in. (152 mm). If the length of the label is 7.5 in. (190 mm), set the parameter for 9.0 in. (229 mm).</p> <p>NOTE: Before beginning the media and ribbon calibration, be sure that the Maximum Length is set one increment greater than the actual media. If the value is set to a smaller value, the print engine assumes that continuous media is loaded and cannot calibrate.</p>

Press	LCD Shows	Action/Explanation
		<p>Initialize Memory Card </p> <p>CAUTION: Perform this operation only when it is necessary to erase all previously stored information from the optional PCMCIA card. Press the NEXT key to bypass this function.</p> <ol style="list-style-type: none"> 1. Press the RIGHT BLACK OVAL key to select “YES.” If your print engine is set to require a password, you are prompted to enter the password. Enter the password and press the NEXT key. 2. The LCD shows “INITIALIZE CARD.” Press the RIGHT BLACK OVAL key to select “YES.” 3. The LCD shows “ARE YOU SURE.” 4. Press the RIGHT BLACK OVAL key “YES” to begin initialization. <i>or</i> Press the LEFT BLACK OVAL key “NO” to cancel the request and return to the “INITIALIZE CARD” prompt. 5. Press the SETUP/EXIT key followed by the NEXT key. If initialization is still in process, the LCD flashes back and forth between the two phrases “CHECKING B: MEMORY” and “PRINTER IDLE.” When initialization is complete, the print engine automatically exits the setup mode and the LCD shows “PRINTER READY.” <p>NOTE: Depending on the amount of memory in the memory card, initialization may take up to five minutes to complete.</p>
	 	<p>Initialize Flash Memory </p> <p>CAUTION: Perform this operation only when it is necessary to erase all previously stored information from the FLASH memory. Press the NEXT key to bypass this function.</p> <ol style="list-style-type: none"> 1. Press the RIGHT BLACK OVAL key to select “YES.” If your print engine is set to require a password, you are prompted to enter the password. Enter the password and press the NEXT key. 2. The LCD shows “INITIALIZE FLASH.” Press the RIGHT BLACK OVAL key to select “YES.” 3. The LCD shows “ARE YOU SURE.” 4. Press the RIGHT BLACK OVAL key “YES” to begin initialization. <i>or</i> Press the LEFT BLACK OVAL key “NO” to cancel the request and return to the “INITIALIZE FLASH” prompt. 5. Press the SETUP/EXIT key followed by the NEXT key. If initialization is still in process, the LCD flashes back and forth between the two phrases “CHECKING E: MEMORY” and “PRINTER IDLE.” When initialization is complete, the print engine automatically exits the setup mode and the LCD shows “PRINTER READY.” <p>NOTE: Depending on the amount of free FLASH memory, initialization may take up to one minute to complete.</p>

Media and Ribbon Sensor Calibration

NOTE: Before beginning this procedure, make sure that the media type has been configured, and that the maximum length is set to a value equal to or greater than the length of the labels being used. If the maximum length is set to a smaller value, the calibration process assumes that continuous media is in the print engine. See page 23 for more information.



Perform this procedure when the print engine is first put into service. The calibration allows the print engine to establish the proper settings for the specific media and ribbon used in your application.

There are two different types of calibration that can be performed by the print engine:

NOTE: The print engine must be paused before pressing the CALIBRATE key.

1) Standard Calibration: Press the CALIBRATE key on the print engine's front panel. The print engine feeds media and ribbon, and sets the values it detects for media, media liner (the gaps between labels), media out, and ribbon or no ribbon (which determines the print mode—thermal transfer or direct thermal). This type of calibration also occurs as part of the sensor profile and media and ribbon calibration procedures.

2) Media and Ribbon Sensor Sensitivity Calibration: Performing the media and ribbon calibration procedure resets the sensitivity of the sensors to detect the media and ribbon you are using more easily. With the sensors at their new sensitivity, the print engine then performs the standard calibration described above. Changing the type of ribbon and/or media may require resetting the sensitivity of the media and ribbon sensors. Indications that the sensitivity may need to be reset include a CHECK RIBBON light on with the ribbon properly installed or non-continuous media being treated as continuous media.

Press	LCD Shows	Action/Explanation
		Sensor Profile: Press NEXT to skip this standard calibration procedure and continue with the media and ribbon calibration parameter that follows. Press the RIGHT BLACK OVAL key to initiate this standard calibration procedure and print a media sensor profile. See Figure 8. The media sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or experiences difficulty in determining web location. If the sensitivity of the media and/or ribbon sensors MUST be adjusted, use the media and ribbon sensor sensitivity procedure described on page 23.

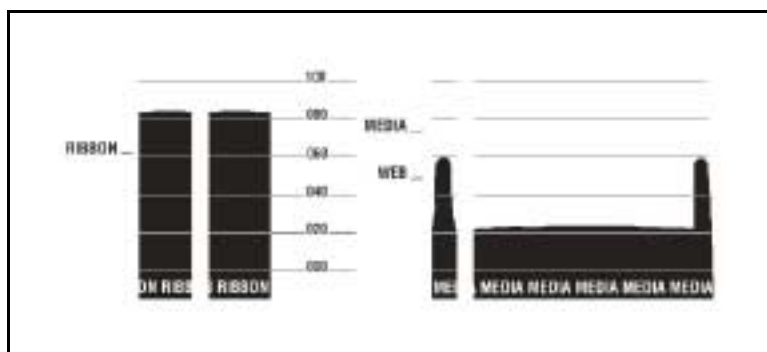






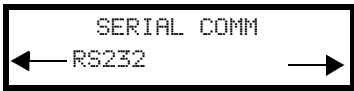














Figure 8. Media Sensor Profile




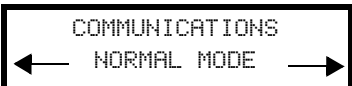
Press	LCD Shows	Action/Explanation
	<div>MEDIA AND RIBBON CALIBRATE</div>	<p>Media and Ribbon Sensor Sensitivity: Press NEXT to skip the calibration procedure and continue with the host port selection parameters that follow. Press the RIGHT BLACK OVAL key to start the calibration procedure.</p> <p>This procedure is used to adjust the sensitivity of the media and ribbon sensors. Changing the type of ribbon or media may require that this calibration be performed. Indications that calibration is necessary are RIBBON LIGHT on when the ribbon is properly installed and non-continuous media being treated as continuous media.</p> <p>NOTE: The procedure must be followed exactly as presented. All steps must be performed even if only one of the sensors requires adjustment.</p>
Media and Ribbon Calibration Procedure		
	<div>LOAD BACKING CANCEL CONTINUE</div>	<p>Press the LEFT BLACK OVAL key to cancel the operation, or do the following:</p> <ol style="list-style-type: none"> 1. Open the printhead. 2. Remove enough labels from the media roll so that only the media liner is threaded between the media sensors when the media is loaded (approximately 8" or 203 mm).
	<div>REMOVE RIBBON CANCEL CONTINUE</div>	<p>Press the LEFT BLACK OVAL key to cancel the operation or do the following:</p> <ol style="list-style-type: none"> 1. Remove the ribbon. 2. Close the printhead. 3. Press the RIGHT BLACK OVAL key to continue.
	<div>CALIBRATING PLEASE WAIT</div>	The print engine automatically adjusts the scale (gain) of the signals it receives from the media and ribbon sensors based on the specific media and ribbon combination being used. On the sensor profile, this essentially corresponds to moving the graph up or down to optimize the readings for your application.
—	<div>RELOAD ALL CONTINUE</div>	<p>When "RELOAD ALL" is displayed:</p> <ol style="list-style-type: none"> 1. Open the printhead and pull the media forward until a label is positioned under the media sensor. 2. Reinstall the ribbon. 3. Close the printhead. 4. Press the RIGHT BLACK OVAL key to continue.
	<div>MEDIA AND RIBBON CALIBRATE</div>	After scale is changed, the print engine performs a calibration equivalent to pressing the CALIBRATE key. During this process, the print engine checks the readings for the media and ribbon based on the new scale established, determines the label length, and determines whether you are in direct thermal or thermal transfer print mode. The process is now complete! To see the new readings on the new scale, print a sensor profile.

Setting Communication Parameters

Communication parameters must be set correctly for the print engine to communicate with the host. These parameters ensure that the print engine and host are “speaking the same language.” All communication parameters are password protected.

Press	LCD Shows	Action/Explanation
		<p>Setting Serial Communications: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: RS232</p> <p>Selections: RS232, RS422/485, RS485 multidrop</p> <p>Select the communications port that matches the one being used by the host computer.</p>
		<p>Setting Baud: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: 9600</p> <p>Selections: 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600</p> <p>The baud setting of the print engine must match the baud setting of the host for accurate communications to take place. Select the value that matches the one being used by the host.</p>
		<p>Setting Data Bits: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: 7-bits</p> <p>Selections: 7-bits, 8-bits</p> <p>The data bits of the print engine must match the data bits of the host for accurate communications to take place. Set the data bits to match the setting being used by the host.</p> <p>NOTE: Must be set to 8 data bits to use Code Page 850. See the <i>ZPL Programming Guide</i> for more information.</p>






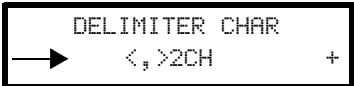
Press	LCD Shows	Action/Explanation
		<p>Setting Parity: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Even</p> <p>Selections: Even, odd, none</p> <p>The parity of the print engine must match the parity of the host for accurate communications to take place. Select the parity that matches the one being used by the host.</p>
		<p>Setting Stop Bits: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: 1 stop bit</p> <p>Selections: 1 stop bit, 2 stop bits</p> <p>The stop bits of the print engine must match the stop bits of the host for accurate communications to take place. Select the stop bits that match the one being used by the host.</p>
		<p>Setting Host Handshake: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: XON/XOFF</p> <p>Selections: XON/XOFF, DTR/DSR</p> <p>The handshake protocol of the print engine must match the handshake protocol of the host for communications to take place. Select the handshake protocol that matches the one being used by the host.</p>
		<p>Setting Protocol: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: None</p> <p>Selections: None, Zebra, ACK/NACK</p> <p>Protocol is a type of error checking system. Depending on the selection, an indicator may be sent from the print engine to the host signifying that data has been received. Select the protocol that is requested by the host. Details on protocol can be found in the <i>ZPL II Programming Guide Volumes I and II</i>.</p> <p>NOTE: Zebra is the same as ACK/NACK except that Zebra response messages are sequenced.</p> <p>NOTE: If Zebra is selected, print engine must use "DTR/DSR" host handshake protocol.</p>





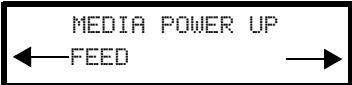


Press	LCD Shows	Action/Explanation
		<p>Setting Network ID: Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit.</p> <p>Default: 000</p> <p>Range: 000–999</p> <p>Network ID is used to assign a unique number to a print engine used in an RS-422/RS-485 network. This gives the host the means to address a specific print engine. If the print engine is used in a network, you must select a network ID number. This does not affect TCP/IP or IPX networks.</p>
		<p>Setting Communications Mode: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Normal mode</p> <p>Selections: Normal mode, diagnostics</p> <p>The communication diagnostics mode is a troubleshooting tool for checking the interconnection between the print engine and the host. When “diagnostics” is selected, all data sent from the host to the print engine is printed as straight ASCII hex characters. The print engine prints all characters received, including control codes, like CR (carriage return). A sample printout is shown in Figure 16 on page 54.</p> <p>NOTES on diagnostic printouts:</p> <ul style="list-style-type: none"> • FE indicates a framing error. • OE indicates an overrun error. • PE indicates a parity error. • NE indicates noise. <p>If there are any errors, check that the communication parameters are correct (see page 24). Set the print width equal to or less than the label width used for the test.</p>







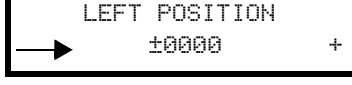
Selecting Prefix and Delimiter Characters




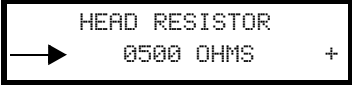


Prefix and delimiter characters are 2-digit hex values used within the ZPL/ZPL II formats sent to the print engine. The print engine uses the last prefix and delimiter characters sent to it, whether from a ZPL II instruction or from the front panel.

NOTE: DO NOT use the same hex value for the control, format, and delimiter character. The print engine needs to see different characters to function properly.





Press	LCD Shows	Action/Explanation
		<p>Control Prefix Character: Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit.</p> <p>Default: 7E (tilde—displayed as a black square)</p> <p>Range: 00–FF</p> <p>The print engine looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II control instruction.</p> <p>NOTE: The “H” that is displayed indicates Hexadecimal and is not entered as part of the value.</p>
		<p>Format Prefix Character: Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit.</p> <p>Default: 5E (caret)</p> <p>Range: 00–FF</p> <p>The print engine looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II format instruction.</p>
		<p>Delimiter Character: Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit.</p> <p>Default: 2C (comma)</p> <p>Range: 00–FF</p> <p>The delimiter character is a 2-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. Refer to the <i>ZPL II Programming Guide Volume I</i> for more information.</p>


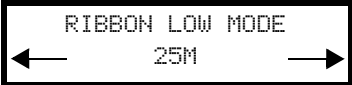


Selecting ZPL Mode 		
Press	LCD Shows	Action/Explanation
		<p>Selecting ZPL Mode: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: ZPL II</p> <p>Selections: ZPL II, ZPL</p> <p>The print engine remains in the selected mode until it is changed by this front panel instruction or by using a ZPL/ZPL II command. The print engine accepts label formats written in either ZPL or ZPL II, eliminating the need to rewrite any ZPL formats that already exist. Refer to the <i>ZPL II Programming Guide Volume II</i> for information on the differences between ZPL and ZPL II.</p>
Power-Up and Head Close Parameters		
		<p>Media Power-Up: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Feed</p> <p>Selections: Feed, calibration, length, and no motion</p> <p>This parameter establishes the action of the media when the print engine is turned on.</p> <ul style="list-style-type: none"> • Calibration: Recalibrates the media and ribbon sensors. • Feed: Feeds the label to the first web. • Length: Determines the length of the label. • No Motion: Media does not move.
		<p>Head Close: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Feed</p> <p>Selections: Feed, calibration, length, no motion</p> <p>Determines the action of the media after the printhead has been opened and then closed.</p> <ul style="list-style-type: none"> • Calibration: Recalibrates the media and ribbon sensors. • Feed: Feeds the label to the first web. • Length: Determines the length of the label. • No Motion: Media does not move.








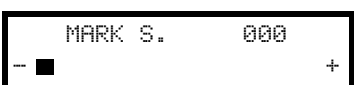

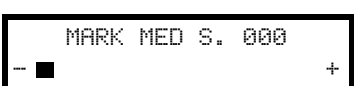

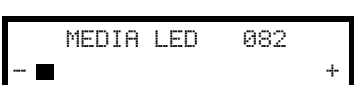

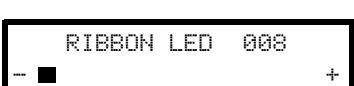


Label Positioning Parameters 		
Press	LCD Shows	Action/Explanation
		<p>Backfeed Sequence: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: After</p> <p>Selections: After, Before, Off</p> <p>This parameter establishes when label backfeed occurs after a label is removed in applicator mode. It has no effect in rewind mode. This parameter setting can be superseded by the ~JS instruction when received as part of a label format (refer to <i>ZPL II Programming Guide Volume I</i>).</p>
		<p>Adjusting Label Top Position: Press the RIGHT BLACK OVAL key to increase the value; press the LEFT BLACK OVAL key to decrease the value. The displayed value represents dots.</p> <p>Default: +0</p> <p>Range: -120 to +120 dot rows</p> <p>The label top position adjusts the print position vertically on the label. Positive numbers adjust the label top position further down the label (away from the printhead); negative numbers adjust the position up the label (toward the printhead).</p>
		<p>Adjusting Left Position: Press the LEFT BLACK OVAL key to move to the next position, press the RIGHT BLACK OVAL key to change between + and – and to increase the value of the digit. The displayed value represents dots.</p> <p>Default: 0000</p> <p>Range: -9999 to +9999</p> <p>NOTE: For a negative value, enter the value before changing to the minus sign.</p> <p>This parameter establishes how far from the left edge of a label the format begins to print by adjusting horizontal positioning on the label. Positive numbers adjust the printing away from the main frame by the number of dots selected; negative numbers shift printing toward the main frame.</p>










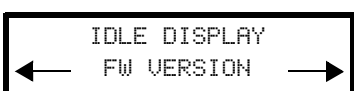




Press	LCD Shows	Action/Explanation
		<p>Setting the Head Test Count: Press the LEFT BLACK OVAL key to move the cursor, press the RIGHT BLACK OVAL key to change the value of the digit.</p> <p>Default: 0000 (disables the test)</p> <p>Range: 0000–9999</p> <p>The print engine periodically performs a test of the printhead functionality, called a “printhead test” or “head test.” This parameter establishes how many labels are printed between these internal tests.</p>
		<p>Setting the Head Resistor Value: Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit.</p> <p>CAUTION: This parameter should be changed only by qualified personnel!</p> <p>Initial Value: Factory-set to match the printhead shipped with your print engine.</p> <p>Default Value: 0500</p> <p>Range: 488 to 2415</p> <p>This value has been pre-set at the factory to match the resistance value of the printhead. It does not need to be changed unless the printhead is replaced.</p> <p>CAUTION: DO NOT set the value higher than that shown on the printhead. Setting a higher value may damage the printhead!</p> <p>A label on the bottom of the printhead element shows the resistance value (ohm value) for the printhead. Take note of the value before installing the replacement printhead.</p>
		<p>Setting the Applicator Port: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Off</p> <p>Selections: Off, mode 1, mode 2, mode 3, mode 4</p> <p>Determines how the print engine interfaces with the applicator.</p> <ul style="list-style-type: none"> • Off: The applicator port is off. • Mode 1: Asserts the ~END_PRINT signal low while the print engine is moving the label forward. • Mode 2: Asserts the ~END_PRINT signal high while the print engine is moving the label forward. • Mode 3: Asserts the ~END_PRINT signal low for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes. • Mode 4: Asserts the ~END_PRINT signal high for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes.








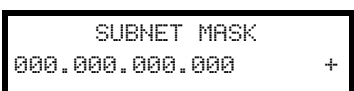

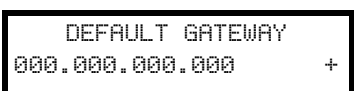
Printing Controls

Press	LCD Shows	Action/Explanation
		<p>Start Print Signal: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Pulse Mode</p> <p>Selections: Pulse Mode, Level Mode</p> <p>This parameter determines how the print engine reacts to the Start Print Signal input on pin 3 of the applicator interface connector at the rear of the print engine.</p> <ul style="list-style-type: none"> In Pulse Mode, labels print when the signal transitions from HIGH to LOW. In Level Mode, labels print as long as the signal is asserted LOW. <p>CAUTION: Start Print Signal is set by the applicator manufacturer and should not be changed unless the factory defaults have been reloaded. Please make a note of it! While other choices are valid, the print engine must be returned to its designated setting in order for it to work properly.</p>
		<p>Resynch Mode: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Feed Mode</p> <p>Selections: Feed Mode, Error Mode</p> <p>This parameter determines how the print engine reacts if the label synchronization is lost and the label top is not where expected.</p> <p>FEED MODE—If the label top is not where expected, the print engine feeds a blank label to find the label top position.</p> <p>ERROR MODE—If the label top is not where expected, the print engine stops, enters the PAUSED mode, displays the message “Error Condition Feed Label”, flashes the ERROR LED, and asserts the “Service Required” signal (pin 10 on the Applicator Interface Connector).</p> <p>To resynch the media to the top of the label in this mode, press the PAUSE key to exit the PAUSED state. The ERROR LED stops flashing and the “Service Required” signal is deactivated. The action of the print engine is determined by the “Head Close” configuration selection:</p> <ul style="list-style-type: none"> “Calibration”: the print engine feeds labels and recalibrates the media sensors. “Feed”: the print engine feeds the labels to the next web. “Length”: the print engine feeds labels and calculates the label length. “No Motion”: the media does not move. The user must press the FEED key to cause the print engine to resynch to the start of the next label.









Press	LCD Shows	Action/Explanation
		<p>Ribbon Low Mode: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: 25M</p> <p>Range: Off, 25M, 50M, 75M, 100M</p> <p>When the Ribbon Low feature is off, the output signal (Pin 9) does not function, the “Low Ribbon” warning is not displayed, and the print engine continues to print until it runs out of ribbon.</p> <p>When the Ribbon Low feature is set to any of the lengths, output signal (Pin 9) on the applicator port is functional. When the amount of ribbon on the supply spindle reaches the specific length, the output signal asserts HIGH to provide a “Ribbon Low” warning.</p>
		<p>Reprint Mode: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Disabled</p> <p>Range: Enabled, Disabled</p> <p>When the Reprint feature is enabled, the “Reprint” input signal (Pin 6) on the applicator port is functional. When the input signal is asserted, the last label printed is printed again. (This includes non-printing labels.) Pressing the PAUSE key also prints the last label printed.</p> <p>When the Reprint feature is disabled, the “Reprint” input signal is ignored.</p> <p>NOTE: The <code>^SP</code> command is ignored when the Reprint feature is enabled. When the Reprint feature is disabled, the <code>^SP</code> command can be used. In addition, when a received label format is canceled prior to printing, the “reprint” function for the previous label is also canceled. Refer to the <i>ZPL II Programming Guide</i> for additional information.</p>

Press	LCD Shows	Action/Explanation
		<p>These parameters are automatically set during the calibration procedure and should be changed only by a qualified service technician. Refer to the <i>ZPL II Programming Guide</i> for information on these parameters.</p> <p>Press the NEXT key repeatedly to skip these parameters.</p>
		
		
		
		
		
		
		

Press	LCD Shows	Action/Explanation
		LCD Adjustment: Press the LEFT BLACK OVAL key to decrease the value (reduce brightness); press the RIGHT BLACK OVAL key to increase the value (increase brightness). Range: 00 to 19 This parameter allows you to adjust the brightness of your LCD if it is difficult to read.
		Format Convert: Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: None Selections: None, 150-300, 150-600, 200-600, 300-600 Selects the bitmap scaling factor. The first number is the original dots-per-inch (dpi) value; the second is the dpi to which you would like to scale.
		RTS Takeup Dancer Arm Calibration Value: This parameter is used as a diagnostic tool to monitor the voltage supplied to the Ribbon Tensioning System Takeup Dancer Arm. Refer to the Maintenance Manual for information.
		RTS Supply Dancer Arm Calibration Value: This parameter is used as a diagnostic tool to monitor the voltage supplied to the Ribbon Tensioning System Supply Dancer Arm. Refer to the Maintenance Manual for information.
		Idle Display: Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: Firmware version Selections: mm/dd/yy (24 hour), mm/dd/yy (12 hour), dd/mm/yy (24 hour), dd/mm/yy (12 hour), Firmware version This parameter selects the LCD options for the real-time clock. NOTE: If the default value is not selected, pressing either BLACK OVAL key briefly displays the firmware version of the print engine.
		RTC Date: Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter allows you to set the date following the convention selected in "IDLE DISPLAY."
		RTC Time: Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter allows you to set the time following the convention selected in "IDLE DISPLAY."

Press	LCD Shows	Action/Explanation
		IP Resolution* : Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default : Dynamic Selections : Dynamic, permanent Depending on the selection, allows either the user (“permanent”) or the server (“dynamic”) to select the IP address. For more information, refer to <i>ZebraNet Networking: PrintServer II Installation and User’s Guide</i> .
		IP Protocols* : Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default : All Selections : All, gleaning only, RARP, BOOTP, DHCP, DHCP/BOOTP If “dynamic” was chosen in the previous parameter, this selection determines the method(s) by which the PrintServer II receives the IP address from the server. For more information, refer to <i>ZebraNet Networking: PrintServer II Installation and User’s Guide</i> .
		IP Address* : Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter selects the IP address if “permanent” was chosen in “IP RESOLUTION.” (If “dynamic” was chosen, the user cannot select the address.) For more information, refer to <i>ZebraNet Networking: PrintServer II Installation and User’s Guide</i> .
		Subnet Mask* : Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default : Permanent (user must set) Selections : Dynamic (user may set but server can assign), permanent This parameter selects the part of the IP address that is considered to be part of the local network. It can be reached without going through the default gateway.
		Default Gateway* : Press the LEFT BLACK OVAL key to move to the next digit position; press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter selects the IP address that the network traffic is routed through if the destination address is not part of the local network.

* ZebraNet® PrintServer II option required

Press	LCD Shows	Action/Explanation
		<p>Selecting the Display Language: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: English</p> <p>Selections: English, Spanish, French, German, Italian, Norwegian, Portuguese, Swedish, Danish, Spanish 2, Dutch, Finnish, Japanese, Custom</p> <p>This parameter allows you to change the language shown on the LCD.</p>
You have now completed the entire configuration and calibration sequence. You may press either the NEXT key or the SETUP/EXIT key.		
		<p>You are now back at the first parameter in the configuration sequence.</p> <p>NOTE: If you pressed the NEXT key but are through programming the print engine configuration, you may press the SETUP/EXIT key and continue with the “SAVE SETTINGS” function.</p>
		<p>Save Settings: Press the RIGHT or LEFT BLACK OVAL key to display other choices.</p> <p>Default: Permanent</p> <p>Selections: Permanent, temporary, cancel, load defaults, load last save</p> <p>This display appears when you attempt to exit the setup mode.</p> <ul style="list-style-type: none"> • Permanent: Permanently saves the changes, even when print engine power is turned off. • Temporary: Saves the changes until changed again or until power is turned off. • Cancel: Cancels all changes since you entered the setup mode except for darkness and tear-off position (if they were changed). • Load defaults: Loads factory defaults. <p>NOTE: Loading factory defaults requires calibration.</p> <ul style="list-style-type: none"> • Load last save: Loads the values from the last permanent save.
		<p>Press the NEXT key to activate the displayed choice.</p> <p>You have exited the configuration and calibration sequence and are now ready for normal print engine operation.</p>

Care & Adjustments

Cleaning



CAUTION: Use only the cleaning agents indicated. Zebra Technologies Corporation will not be responsible for damage caused by any other cleaning materials used on the 116PAX3 print engine.

Table 1 provides a recommended cleaning schedule. Cleaning swabs saturated with 90% Isopropyl Alcohol are available from your Zebra distributor as a Preventive Maintenance Kit (part # 47362M).

Table 1. Recommended Cleaning Schedule

AREA	METHOD	INTERVAL
See Figures 9 and 10 for parts locations.		
Printhead (1)	Alcohol	After every 450' (150 m) of media.
Platen Roller (2)	Alcohol	After every roll of ribbon when printing in the thermal transfer mode. After every roll of media when printing in the direct thermal mode.
Media Path	Alcohol	
Transmissive Media Sensor (3)	Air blow/Vacuum	
Reflective Media Sensor (4)	Air blow/Vacuum	
Ribbon Sensor (Q, Figures 4 and 5 shown on pages 7 and 8)	Alcohol	
Ribbon Sensor Reflector (R, Figures 4 and 5 shown on pages 7 and 8)	Alcohol	
Door-Open Sensor (5)	Air blow/Vacuum	After every roll of media or more often if needed.
Peel Bar (6)	Alcohol	

Cleaning the Exterior

The exterior surfaces of the print engine may be cleaned with a lint-free cloth. *Do not use harsh or abrasive cleaning agents or solvents!* If necessary, a mild detergent solution or desktop cleaner may be used sparingly.

Cleaning the Interior

Remove any accumulated dirt and lint from the interior of the print engine using a soft bristle brush and/or vacuum cleaner. This area should be inspected every time a new ribbon is loaded.

Cleaning the Sensors

To ensure proper operation of the print engine, all sensors should be cleaned on a regular basis. To locate the position of the media and door-open sensors, refer to Figure 9. Refer to Figure 4 on page 7 and Figure 5 on page 8 for the ribbon sensor and ribbon sensor reflector.

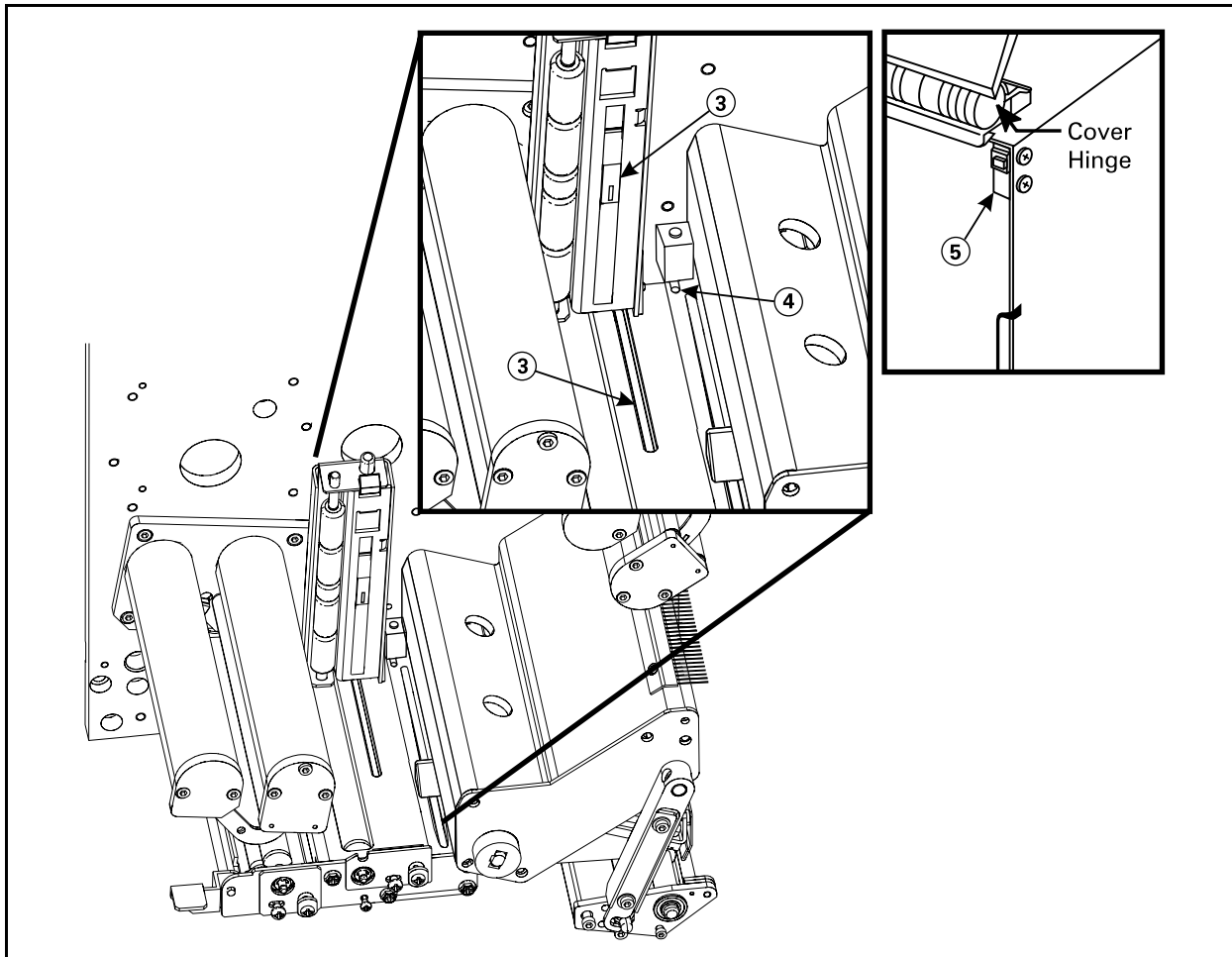


Figure 9. Sensor Locations (RH)

Cleaning the Printhead and Platen Roller

Inconsistent print quality (such as voids in the bar code or graphics) or light print may indicate a dirty printhead. Media movement problems may indicate a dirty platen. For optimum print quality, perform the following cleaning procedure after every roll of media (or 150 meters) or when a “Clean Head Now” warning appears on the LCD.



NOTES: If print quality has degraded and you have not changed to a different type of media or ribbon, cleaning the printhead may solve the problem. It should not be necessary to change the darkness setting or the toggle pressure.

You do not need to turn off the print engine before cleaning the printhead. If power is turned off, all label formats and images, as well as any temporarily saved parameter settings stored in the print engine’s internal memory, are lost. When power is turned back on, these items must be reloaded.

If power is removed from the print engine when cleaning the printhead, the “Clean Head Now” warning shown on the LCD will not disappear.



WARNING: An improperly seated printhead data cable or power cable could result in the printhead generating excessive heat that could cause harm if it is touched.

To clean the printhead and platen roller, refer to Figure 10 and perform the following steps:

1. Open the printhead assembly (B) by lifting the printhead latch (C) upward away from the locking pin (D). Remove the media and ribbon.
2. Brush, vacuum, or air blow any accumulated lint and paper dust away from the rollers. *It is good practice to clean the media, ribbon, and door-open sensors at this time. See Figure 9, Figure 4 on page 7, and Figure 5 on page 8.*
3. Use a cleaning swab saturated with alcohol to wipe the print elements from end to end. The print elements form the grayish/black strip (1) just behind the chrome strip on the underside of the printhead. Allow a few seconds for the solvent to evaporate.
4. Use a lint-free cloth moistened with alcohol to clean the platen roller (2) and other rollers. Rotate the rollers while cleaning.
5. Reload the ribbon and/or media, latch the printhead, and continue printing.

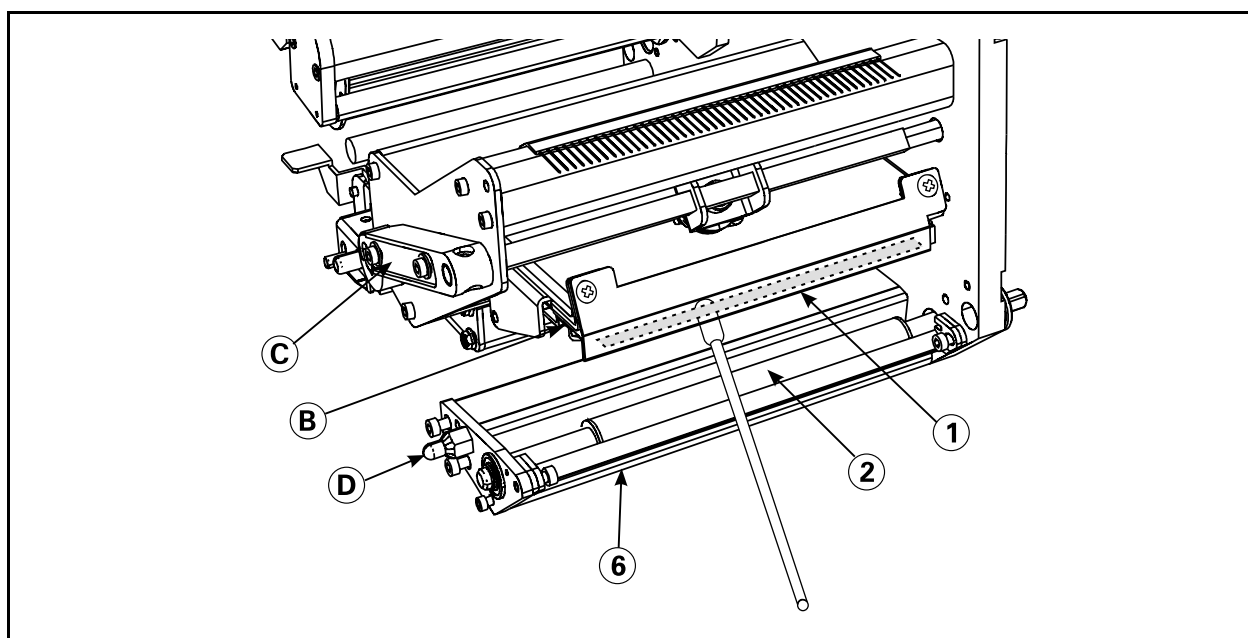


Figure 10. Printhead and Platen Roller Cleaning (RH)



NOTE: If print quality has not improved, try cleaning the printhead with *Save-a-Printhead* cleaning film. This specially coated material removes contamination buildup without damaging the printhead. Call your authorized Zebra distributor to order the *Save-a-Printhead* cleaning kit for the 116PAX3 print engine (part # 46902M).

Extend the Life of Your Printhead with *Save-a-Printhead* Cleaning Film

(Recommended for all Zebra print engines—especially 600 dpi print engines).

Challenge

The printhead is the most critical component in your print engine, and possibly the most delicate. It is a consumable item just like the brakes on your car, which eventually wear over time. However, with ongoing careful attention and maintenance, you can *extend the life of the printhead*.

Figure 11 shows photographs of three printheads. The first printhead is brand new. The second has printed over 1 million linear inches of thermal transfer labels and has been properly maintained. The third printhead has printed far fewer labels, but without proper care and maintenance, signs of abrasion and contamination buildup are evident.

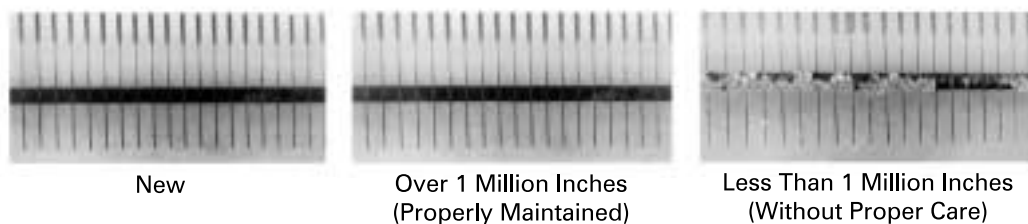


Figure 11. Effects of Printhead Maintenance

Printhead Preventive Maintenance

For optimum performance, clean the printhead regularly after every roll of media (or 150 meters) or when a “Clean Head Now” warning appears on the LCD. Take care when handling or cleaning the printhead by removing any jewelry that may scratch the printhead and use a grounding strap or anti-static mat to discharge static electricity that could damage the printhead.

To start, use only the pre-soaked (isopropyl alcohol) cleaning swabs provided in the preventive maintenance kit. First, open the media cover to access the printhead, then open the printhead. Lightly blow or brush away any loose dust and lint particles within the print mechanism (i.e., rollers, media/ribbon sensors, and printhead). NEVER use any hard, metallic, or abrasive objects—such as a screwdriver—to remove adhesives or other contaminants that may have built up on the printhead.

Next, press the swab tip against the printhead and swipe the print elements from end to end. Then, turn the platen rollers while wiping them from side to side. Repeat this step until the swab no longer shows dirt.

Avoid the Contributing Factors to Premature Printhead Failure

Abrasion: Over time, the movement of media/ribbon across the printhead wears through the protective ceramic coating, exposing and eventually damaging the print elements (dots).

In order to avoid abrasion:

- Clean your printhead frequently and use well-lubricated thermal transfer ribbons with backcoatings optimized to reduce friction.
- Minimize printhead pressure and burn temperature settings by optimizing the balance between the two.
- Ensure that the thermal transfer ribbon is as wide or wider than the label media to prevent exposing the elements to the more abrasive label material.

Ribbon Backcoating and Buildup: Printhead contamination from direct thermal media or thermal transfer ribbon may occur in applications requiring high burn settings, high head pressure, high speed, or high volume. This contamination builds up on the printhead elements, creating a barrier to the heat transformation required to produce high-quality images. Contaminant buildup occurs gradually and results in poor print quality that may look like faded print or failed print element(s). This buildup is very resistant to cleaning with the pre-soaked swabs and is difficult to remove.

In order to avoid ribbon backcoating and buildup:

- Use thermal transfer ribbons that have been specially cured to provide backcoat protection for high-demand applications. These ribbons—sometimes referred to as anti-stick ribbons—also dissipate static and provide more lubrication.
- Follow the recommended Printhead Preventive Maintenance procedures.
- Use Zebra's *Save-a-Printhead* cleaning film to remove printhead contamination buildup quickly and easily.

***Save-a-Printhead* Cleaning Film**

Save-a-Printhead cleaning film is a specially coated film that removes contamination buildup without damaging the printhead.

Save-a-Printhead cleaning film extends the life of your printhead, reduces maintenance downtime and the cost of replacing a printhead, and is an inexpensive, easy, and quick way to remove contaminants without having to remove the printhead.

Use *Save-a-Printhead* cleaning film when you see degrading print quality that looks like faded print or a failed print element(s) that cannot be corrected by cleaning with the pre-soaked cleaning swabs.

How to Use *Save-a-Printhead* Cleaning Film



NOTE: If power is removed from the print engine when cleaning the printhead, the “Clean Head Now” warning shown on the LCD will not disappear.



WARNING: An improperly seated printhead data cable or power cable could result in the printhead generating excessive heat that could cause harm if it is touched.

1. Open the media cover.
2. Open the printhead, remove media and ribbon from the print mechanism.
3. Clean the printhead per the recommended Preventive Maintenance procedures.
4. Position the *Save-a-Printhead* film in the print path, placing the glossy side down away from the printhead (matte side up).
5. Close and latch the printhead.
6. Slowly pull the full length of the film through the print mechanism.
7. Again, clean the printhead per the recommended Preventive Maintenance procedures.
8. Reload media and ribbon, close and latch the printhead.
9. Close the media cover.
10. Print labels and inspect for improved print quality. If quality has not improved, contact Zebra's Technical Support staff at 1.847.913.2259 or visit our Web site: <http://www.zebra.com>.

Only one pass of *Save-a-Printhead* film is required to remove contamination buildup, and each strip of film can be used up to 10 times. Discard the strip when residue buildup or other contamination is apparent.

If a replacement printhead is needed, order one directly from Zebra to ensure that your print engine and parts warranties remain intact and that the product performs optimally.


How to Order *Save-a-Printhead* Cleaning Film Kits

The kit contains three 10" (25 cm) long strips of film. Call your authorized Zebra distributor to order the *Save-a-Printhead* cleaning kit for the 116PAX3 print engine (part # 46902M).

Toggle Positioning

Proper toggle positioning is important for proper print quality. The toggle should be positioned approximately midway across the width of the media.

To position the toggle, loosen the position locking nut (T, Figure 12) by rotating it clockwise. Slide the toggle to the desired position, and tighten the locking nut by rotating it counterclockwise until it is just finger tight to the toggle pivot shaft (X).

 **NOTE:** Perform the Printhead Pressure Adjustment procedure on the next page if there is noticeable bleed or swelling in the printed image (too much pressure) or if there are voids (too little pressure).

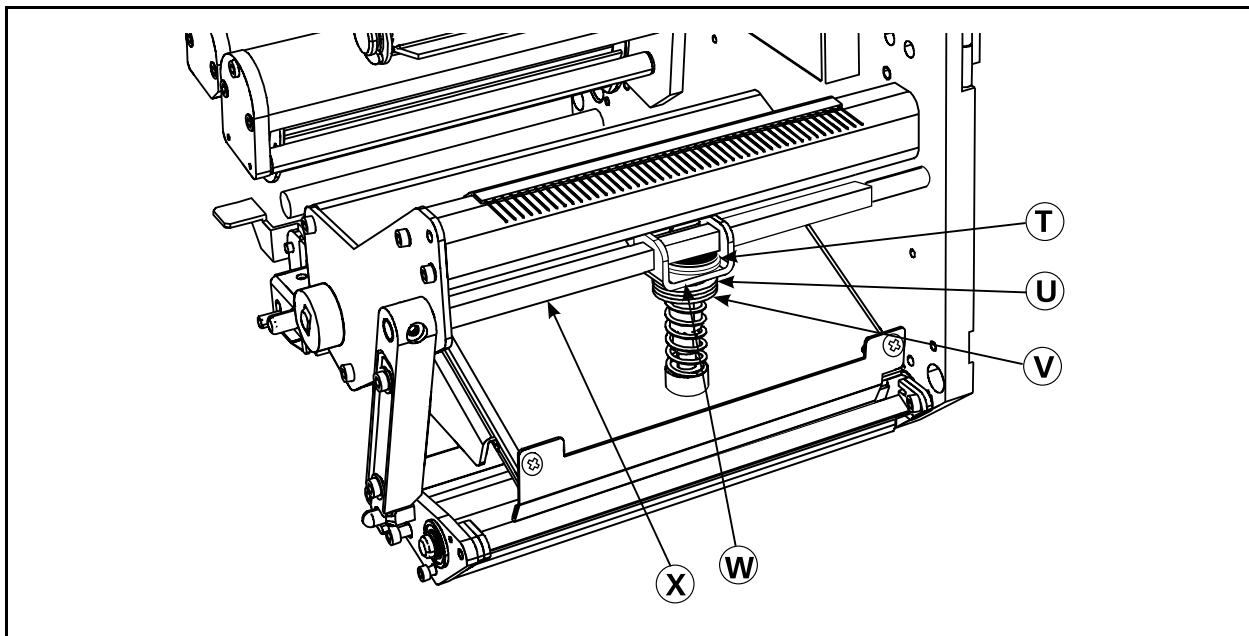


Figure 12. Printhead Pressure (Right-Hand Unit Shown)

Printhead Pressure Adjustment

If the darkness setting (burn duration) is set properly, but printing is too light or if the image shows signs of bleeding or swelling, printhead pressure may need to be adjusted. Refer to Figure 12 to adjust printhead pressure. As a starting point for adjustment, set the position of the adjusting nut (V) so that when the locking nut (U) is tightened, it is approximately 0.4" (10 mm) from the yoke (W). Use the lowest pressure possible that provides the desired print quality.

1. Refer to "Configuration" beginning on page 15 and set the darkness value (burn duration) appropriately for your media and ribbon.
2. Refer to the "PAUSE Key Self Test" on page 51 and print test labels.
3. Loosen the pressure adjustment locking nut (U) on the threaded shaft of the toggle assembly by rotating it counterclockwise.
4. Rotate the adjusting nut (V) clockwise to increase or counterclockwise to decrease the spring pressure.
5. Print test labels and inspect for quality.
6. When print quality is acceptable, hold the adjusting nut (V) in position, and tighten the locking nut (U) against it.



NOTE: Printhead and drive system (belts and bearings) life can be maximized by using the lowest pressure that produces the desired print quality.



Troubleshooting

Power-On Self Test

A Power-On Self Test (POST) is performed each time the print engine is turned ON. During this test, the front panel lights (LEDs) turn ON and OFF to ensure proper operation. At the end of this self test, only the POWER LED remains lit. Once the POST is complete, the media is advanced to the proper resting position, as determined by the programmed Power-Up setting.

To initiate the POST, turn the print engine ON using the power switch on the control panel. The POWER LED illuminates. The other control panel LEDs and the LCD monitor the progress and indicate the results of the individual tests. All displayed prompts occur in English; however, when a test fails, the prompt cycles through the international languages as well.

The normal self-test sequence occurs each time the print engine is turned on, as follows:

1.		All lights turn on simultaneously and then turn off in sequence through the following steps.
2.	SRAM Test	SRAM functionality test performed.
3.	Option ROM Test	Option ROM functionality test performed. The words "Not Installed" are added to the LCD if optional ROM is not used.
4.	Printhead Test	Printhead is checked for proper operation.
5.	Processor Test	Processor functionality test performed. The word "Failed" is added to the LCD if the test fails.
6.	E-Cubed Test	E-cubed functionality test performed. The word "Failed" is added to the LCD if the test fails.
7.	EEPROM Test	EEPROM/PROM functionality test performed. The word "Failed" is added to the LCD if the test fails.
8.	Memory Card Test	Optional PCMCIA Memory Card functionality test performed. The words "Not Installed" are added to the LCD if no card is present.
9.	Flash Memory Test	Optional Flash Memory Card functionality test performed.
10.		Depending on how the ^MF (Media Feed) instruction is set, the print engine feeds to the first web or label length, calibrates ribbon and media sensors, or sets label length and feeds one or more labels.
11.	PRINTER READY x.x.MB UXX.X.X	Print engine is ready for operation. Refer to "Configuration" beginning on page 15 to set specific parameters. Designate prompt language with the ^KL command or from the menu.

The following tables provide symptoms, a diagnosis of specific causes, and a recommended action that should result in proper print engine operation.

If you need technical assistance, contact your equipment supplier.

Power-On Troubleshooting

SYMPTOM	DIAGNOSIS	ACTION
All lights on, but nothing displays on the LCD, and the print engine locks up.	Internal electronic or firmware failure.	Call a service technician.
Print engine locks up while running the Power-On Self Test.	Main Logic Board failure.	Call a service technician.
EEPROM TEST FAILED	EEPROM checksum is incorrect.	Call a service technician.

Print Engine Troubleshooting

SYMPTOM	DIAGNOSIS	ACTION
ERROR CONDITION RIBBON OUT Print engine stops; RIBBON light ON, ERROR light flashes.	For Thermal Transfer: Ribbon not loaded or incorrectly loaded. <i>or</i> Ribbon sensor not detecting ribbon that is loaded incorrectly.	Load ribbon correctly. See "Ribbon Loading" on page 7. Perform "Media and Ribbon Sensor Calibration" on page 22.
WARNING RIBBON IN RIBBON light ON, ERROR light flashes.	For Direct Thermal: Ribbon is loaded. <i>or</i> Media blocking the Ribbon Sensor.	Remove ribbon. Load media correctly. Perform "Media and Ribbon Sensor Calibration" on page 22.
ERROR CONDITION PAPER OUT Print engine stops; MEDIA light ON, ERROR light flashes.	No media loaded or incorrectly loaded. Misadjusted Media Sensor. Print engine set for non-continuous media, but continuous media is loaded.	Load media correctly. See "Media Loading" on page 5. Check position of the Media Sensor. Install proper media or reset print engine for current media type and perform calibration.
ERROR CONDITION HEAD OPEN Print engine stops and ERROR light flashes.	Printhead is not fully closed. Head Open Sensor not working properly.	Close printhead completely. Call a service technician.
WARNING HEAD TOO HOT Print engine stops and ERROR light flashes.	Printhead overheated.	Allow print engine to cool. Printing resumes when the printhead elements cool to operating temperature.
WARNING CLEAN HEAD NOW Front panel LCD text alternates between "Clean Head Now" warning and idle display value.	Printhead requires cleaning.	See page 38 and clean the printhead. NOTE: Do not turn off the print engine while cleaning the printhead. The "Clean Head Now" warning will <u>not</u> disappear from the LCD if the print engine is turned off.

Print Engine Troubleshooting (continued)

SYMPTOM	DIAGNOSIS	ACTION
Print engine stops and PAUSE light goes ON. The LCD displays: <div>OUT OF MEMORY CREATING BITMAP</div> <div>OUT OF MEMORY STORING BITMAP</div> <div>OUT OF MEMORY BUILDING FORMAT</div> <div>OUT OF MEMORY STORING FORMAT</div> <div>OUT OF MEMORY STORING GRAPHIC</div> <div>OUT OF MEMORY STORING FONT</div>	Not enough memory to perform function shown on the second line. Explanation of errors: 1. Creating Bitmap —Bitmap size (label length/width) does not fit in available memory. 2. Storing Bitmap —Not enough memory available to store the bitmap created. 3. Building Format —Label is too complex. 4. Storing Format —Format is too large to fit in available memory. 5. Storing Graphic —Graphic image is too large to fit in available memory. 6. Storing Font —Not enough memory available to store the font.	You may do any of the following: A. With PAUSE on, send a ~HM command to the print engine to display the amount of free memory. Then either: Redesign graphic/format to fit available memory or remove items from memory to create more space. <i>or</i> Press PAUSE to skip the formatting step in process and proceed to the next step. B. With PAUSE on, press CANCEL. The print engine skips the current label formatting process and goes to the next label. C. Turn power OFF and then ON to clear print engine memory and start over. D. Upgrade the print engine to a larger memory size.
Long tracks of missing print on several labels.	Wrinkled ribbon.	See "Wrinkled Ribbon" in this table.
	Print element damaged.	Call a service technician.
	One or more of the printhead elements has failed the printhead element test.	If the failed elements impact your printing application, replace the printhead. To override this error, disable the head test count feature on the front panel by defaulting the value to "0000." See page 30.
Fine, angular gray lines on blank labels.	Wrinkled ribbon.	See "Wrinkled Ribbon" in this table.
Wrinkled ribbon.	Ribbon fed through the machine incorrectly.	See "Ribbon Loading" on page 7.
	Incorrect burn temperature.	Set the burn temperature to the lowest possible setting for good print quality.
	Incorrect or uneven pressure.	Set the pressure to the minimum needed for good print quality. See "Printhead Pressure Adjustment" on page 43.
	Media not feeding properly; "walking" from side to side.	Make sure that media is snug by adjusting the media guide, or call a service technician.
	Strip plate needs adjusting.	Call a service technician.
	Printhead needs vertical adjustment.	Call a service technician.
	Printhead and Platen Roller need to be realigned.	Call a service technician.

Print Engine Troubleshooting (continued)

SYMPTOM	DIAGNOSIS	ACTION
Broken or melted ribbon.	Darkness setting too high.	Reduce setting for best print quality, and clean the printhead thoroughly.
Ribbon tension dancer(s) oscillate erratically.	Ribbon core is not standard size and is slipping on the spindle.	Replace ribbon with one that has a standard core size.
Light printing or no printing on the left or right side of the label.	Printhead pressure needs adjustment, printhead out of alignment, or toggle in incorrect position.	See "Toggle Positioning" on page 42 and "Printhead Pressure Adjustment" on page 43.
		Call a service technician.
Printing too light or too dark over the entire label.	Media or ribbon is not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
	Incorrect or uneven printhead pressure.	Set the pressure to the minimum needed. See "Printhead Pressure Adjustment" on page 43.
Smudge marks on labels.	Media or ribbon not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
Misregistration/skips labels.	Media Sensor not positioned correctly.	Perform Media Sensor position adjustment (see page 9).
	Print engine not calibrated.	Recalibrate print engine.
	Improper label format.	Use correct label format.
Misregistration and misprint of one to three labels.	Media Sensor is not positioned correctly.	Place Media Sensor in proper position (see page 9).
	Platen dirty.	Clean platen (see page 38).
	Media does not meet specifications.	Use media that meets specifications.
Vertical drift in top-of-form position.	A plus or minus 4-6 dot row (approximately 0.5 mm) vertical drift is acceptable due to different tolerances of mechanical parts and print engine modes.	First calibrate print engine, then use the "Label Top Position" setting to correct. See "Configuration and Calibration Sequence" on page 16.
	Print engine out of calibration.	Recalibrate print engine.
	Platen dirty.	Clean platen (page 38).
Missing LCD characters or parts of characters.	LCD may need replacing.	Call a service technician.
Changes in parameter settings did not take effect.	Parameters are set incorrectly.	Set parameters and save permanently. Cycle the print engine power OFF and back ON.
	A ZPL command has turned off the ability to change parameter.	Refer to the <i>ZPL Programming Guide</i> or call a service technician.
	A ZPL command has changed the parameter back to the previous setting.	Refer to the <i>ZPL Programming Guide</i> or call a service technician.
	If problem continues, there may be a problem with the main logic board.	Call a service technician.

Print Engine Troubleshooting (continued)

SYMPTOM	DIAGNOSIS	ACTION
ZPL II was sent to the print engine, but not recognized. DATA light always OFF. <i>or</i> DATA light always flashing.	Communications parameters are incorrect.	Print a Communications Diagnostic Label (see page 26). Check for format or overrun errors. Reset communication parameters (see page 24).
	Incorrect Communications Cable in use.	Verify proper cable and replace if necessary.
	Prefix and delimiter characters set in print engine do not match the ones used in ZPL II format sent to the print engine.	Set the characters in the print engine to match ZPL II format. See “Selecting Prefix and Delimiter Characters” on page 27.
	Incorrect/incomplete ZPL format sent to the print engine.	If problem continues, check the ZPL II format for changed ^CC, ^CT, and ^CD.
Vertical image or label drift.	Print engine using non-continuous labels but configured in continuous mode.	Configure the print engine for non-continuous and run calibration routine, if necessary.
	Incorrectly positioned media sensor.	Ensure the media sensor is properly positioned to read a single/consistent inter-label gap.
	Improperly calibrated media sensor.	Perform “Media and Ribbon Sensor Calibration” on page 22.
	Platen dirty.	Clean platen (see page 38).
	Improper printhead pressure settings (toggles).	Adjust the printhead pressure to ensure proper functionality (see page 43).
	Improperly loaded ribbon or media.	Verify that the ribbon and media are properly loaded (see pages 5–7).
	Incompatible media.	Ensure the inter-label gaps or notches are 2 mm–4 mm and consistently placed. Media must not exceed minimum specifications for mode of operation.

Print Engine Self Tests

Introduction

These self tests, illustrated on the following pages, produce sample labels and provide specific information that help determine the operating conditions for the print engine.

Each self test is enabled by pressing a specific front panel key or combination of keys while turning the power switch ON. Keep the key pressed until the first indicator light turns OFF. The selected self test automatically starts at the end of the POST.



NOTES: When performing these self tests, do not send data to the print engine from the host.

Full width media should be used when performing Print Engine Self Tests. If your media is not wide enough, the test labels may print on the label **and** the platen roller, or in the case of narrow media, not on the label at all. To prevent this from happening, check the configuration parameter “Setting the Print Width” and ensure it is correct for the media you are using.

If your media is too short, the test label continues on the next label.

When canceling a self test prior to its actual completion, always reset the print engine by turning the print engine power OFF and then ON.

If the print engine is in applicator mode and the liner is being taken up by the applicator, the operator must manually remove the labels as they become available.

CANCEL Key Self Test

Press and hold the CANCEL key while turning the print engine power ON. Release the key anytime after the first front panel LED turns OFF.

This self test prints a label that contains a listing of the print engine's current configuration parameters stored in configuration (EEPROM) memory (refer to Figure 13). To enable this test, press the CANCEL key while turning the power switch ON.

The configuration may be changed either temporarily (for specific label formats or ribbon and label stock) or permanently (by saving the new parameters in EEPROM memory). Saving new parameters occurs whenever a print engine calibration procedure is performed. Refer to “Configuration and Calibration Sequence” on page 16 for further details.

```

PRINTER COPY COUNT: 1000
Zebra Technologies
ZTC 168000-L
0A 00 ..... ADDRESS
0000 ..... 168000
0001 ..... 168001
0002 ..... 168002
0003 ..... 168003
0004 ..... 168004
0005 ..... 168005
0006 ..... 168006
0007 ..... 168007
0008 ..... 168008
0009 ..... 168009
0010 ..... 168010
0011 ..... 168011
0012 ..... 168012
0013 ..... 168013
0014 ..... 168014
0015 ..... 168015
0016 ..... 168016
0017 ..... 168017
0018 ..... 168018
0019 ..... 168019
0020 ..... 168020
0021 ..... 168021
0022 ..... 168022
0023 ..... 168023
0024 ..... 168024
0025 ..... 168025
0026 ..... 168026
0027 ..... 168027
0028 ..... 168028
0029 ..... 168029
0030 ..... 168030
0031 ..... 168031
0032 ..... 168032
0033 ..... 168033
0034 ..... 168034
0035 ..... 168035
0036 ..... 168036
0037 ..... 168037
0038 ..... 168038
0039 ..... 168039
0040 ..... 168040
0041 ..... 168041
0042 ..... 168042
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0050 ..... 168050
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0064 ..... 168064
0065 ..... 168065
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0067 ..... 168067
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0069 ..... 168069
0070 ..... 168070
0071 ..... 168071
0072 ..... 168072
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0074 ..... 168074
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0079 ..... 168079
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0095 ..... 168095
0096 ..... 168096
0097 ..... 168097
0098 ..... 168098
0099 ..... 168099
0100 ..... 168100
0101 ..... 168101
0102 ..... 168102
0103 ..... 168103
0104 ..... 168104
0105 ..... 168105
0106 ..... 168106
0107 ..... 168107
0108 ..... 168108
0109 ..... 168109
0110 ..... 168110
0111 ..... 168111
0112 ..... 168112
0113 ..... 168113
0114 ..... 168114
0115 ..... 168115
0116 ..... 168116
0117 ..... 168117
0118 ..... 168118
0119 ..... 168119
0120 ..... 168120
0121 ..... 168121
0122 ..... 168122
0123 ..... 168123
0124 ..... 168124
0125 ..... 168125
0126 ..... 168126
0127 ..... 168127
0128 ..... 168128
0129 ..... 168129
0130 ..... 168130
0131 ..... 168131
0132 ..... 168132
0133 ..... 168133
0134 ..... 168134
0135 ..... 168135
0136 ..... 168136
0137 ..... 168137
0138 ..... 168138
0139 ..... 168139
0140 ..... 168140
0141 ..... 168141
0142 ..... 168142
0143 ..... 168143
0144 ..... 168144
0145 ..... 168145
0146 ..... 168146
0147 ..... 168147
0148 ..... 168148
0149 ..... 168149
0150 ..... 168150
0151 ..... 168151
0152 ..... 168152
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0163 ..... 168163
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0166 ..... 168166
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0169 ..... 168169
0170 ..... 168170
0171 ..... 168171
0172 ..... 168172
0173 ..... 168173
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0191 ..... 168191
0192 ..... 168192
0193 ..... 168193
0194 ..... 168194
0195 ..... 168195
0196 ..... 168196
0197 ..... 168197
0198 ..... 168198
0199 ..... 168199
0200 ..... 168200
0201 ..... 168201
0202 ..... 168202
0203 ..... 168203
0204 ..... 168204
0205 ..... 168205
0206 ..... 168206
0207 ..... 168207
0208 ..... 168208
0209 ..... 168209
0210 ..... 168210
0211 ..... 168211
0212 ..... 168212
0213 ..... 168213
0214 ..... 168214
0215 ..... 168215
0216 ..... 168216
0217 ..... 168217
0218 ..... 168218
0219 ..... 168219
0220 ..... 168220
0221 ..... 168221
0222 ..... 168222
0223 ..... 168223
0224 ..... 168224
0225 ..... 168225
0226 ..... 168226
0227 ..... 168227
0228 ..... 168228
0229 ..... 168229
0230 ..... 168230
0231 ..... 168231
0232 ..... 168232
0233 ..... 168233
0234 ..... 168234
0235 ..... 168235
0236 ..... 168236
0237 ..... 168237
0238 ..... 168238
0239 ..... 168239
0240 ..... 168240
0241 ..... 168241
0242 ..... 168242
0243 ..... 168243
0244 ..... 168244
0245 ..... 168245
0246 ..... 168246
0247 ..... 168247
0248 ..... 168248
0249 ..... 168249
0250 ..... 168250
0251 ..... 168251
0252 ..... 168252
0253 ..... 168253
0254 ..... 168254
0255 ..... 168255
0256 ..... 168256
0257 ..... 168257
0258 ..... 168258
0259 ..... 168259
0260 ..... 168260
0261 ..... 168261
0262 ..... 168262
0263 ..... 168263
0264 ..... 168264
0265 ..... 168265
0266 ..... 168266
0267 ..... 168267
0268 ..... 168268
0269 ..... 168269
0270 ..... 168270
0271 ..... 168271
0272 ..... 168272
0273 ..... 168273
0274 ..... 168274
0275 ..... 168275
0276 ..... 168276
0277 ..... 168277
0278 ..... 168278
0279 ..... 168279
0280 ..... 168280
0281 ..... 168281
0282 ..... 168282
0283 ..... 168283
0284 ..... 168284
0285 ..... 168285
0286 ..... 168286
0287 ..... 168287
0288 ..... 168288
0289 ..... 168289
0290 ..... 168290
0291 ..... 168291
0292 ..... 168292
0293 ..... 168293
0294 ..... 168294
0295 ..... 168295
0296 ..... 168296
0297 ..... 168297
0298 ..... 168298
0299 ..... 168299
0300 ..... 168300
0301 ..... 168301
0302 ..... 168302
0303 ..... 168303
0304 ..... 168304
0305 ..... 168305
0306 ..... 168306
0307 ..... 168307
0308 ..... 168308
0309 ..... 168309
0310 ..... 168310
0311 ..... 168311
031
```

Figure 13. CANCEL Key Self Test

PAUSE Key Self Test

Press and hold the PAUSE key while turning the print engine power ON. Release the key anytime after the first front panel LED turns OFF.

This self test comprises four individual test features:

1. The initial self test prints 15 labels at the slowest speed of print engine, then automatically pauses the print engine. When the PAUSE key is pressed, an additional 15 labels print.
2. While the print engine is paused, alter the self test by pressing the CANCEL key once. When the PAUSE key is pressed, the print engine prints 15 labels at 4" (102 mm) per second.
3. While the print engine is paused, alter the self test a second time by pressing the CANCEL key once. When the PAUSE key is pressed, the print engine prints 50 labels at the slowest speed.
4. While the print engine is paused, alter the self test a third time by pressing the CANCEL key once. When the PAUSE key is pressed, the print engine prints 50 labels at 4" (102 mm) per second.
5. While the print engine is paused, alter the self test a fourth time by pressing the CANCEL key once. When the PAUSE key is pressed, the print engine prints 15 labels at the maximum speed of the print engine.

This self test can be used to provide the test labels required when making adjustments to the print engine's mechanical assemblies. See Figure 14.

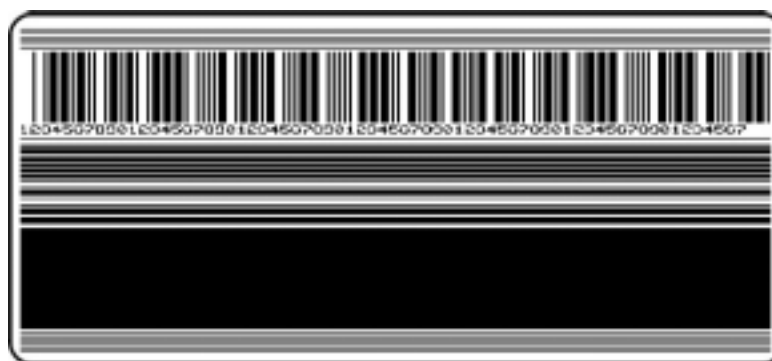


Figure 14. PAUSE Key Self Test Sample Printout

FEED Key Self Test

Press and hold the FEED key while turning the print engine power ON. Release the key any time after the first front panel LED turns OFF.



NOTE: The CANCEL Key Self Test should be performed prior to this self test. Information on the printed configuration label can be used with the results of this self test to determine the best darkness setting for a specific media/ribbon combination.

Each label is printed at a different darkness setting, starting at three integer (whole number) settings below the currently configured value and increasing until it is three settings darker than the configured value. The relative darkness and speed are printed on each label. The bar codes on these labels can be ANSI-graded to check print quality.

Compare these labels to determine which has the best print quality. Then add or subtract the value printed on that label from the darkness value specified on the configuration label. The resulting numeric value (0.0 to 30.0) is the best darkness value for that specific media/ribbon combination. Use the front panel configuration process to set the Print Darkness parameter to the new value. Refer to Figure 15 for an example of the label.



NOTE: The best print quality for certain media and ribbon combinations may be achieved by using a darkness setting between whole numbers (for example, 7.8).



Figure 15. FEED Key Self Test

FEED Key and PAUSE Key Self Test


Press and hold these two keys while turning the print engine power ON. The print engine configuration is temporarily reset to the factory default values. These values remain active until power is turned OFF. **If the factory default values are permanently saved, a media calibration procedure must be performed. You must also reset the head resistance value and the applicator port settings to their required values (see “Configuration and Calibration Sequence” beginning on page 16).**

The following chart indicates which print engine function controls each of the configuration parameters:


Parameter	Controlled by
Darkness	Configuration, ZPL, and WebView
Tear Off	Configuration, ZPL, and WebView
Print Mode	Configuration, ZPL, and WebView
Media Type	Calibration, Configuration, ZPL, and WebView
Sensor Type	Configuration, ZPL, and WebView
Print Method	Calibration, Configuration, ZPL, and WebView
Print Width	Configuration, ZPL, and WebView
Label Length	Calibration, Configuration, ZPL, and WebView
Maximum Length	Configuration, WebView, and Memory Size
Host Port	Configuration and WebView
Baud	Configuration, ZPL, and WebView
Data Bits	Configuration, ZPL, and WebView
Parity	Configuration, ZPL, and WebView
Stop Bits	Configuration, ZPL, and WebView
Host Handshake	Configuration, ZPL, and WebView
Protocol	Configuration, ZPL, and WebView
Network ID	Configuration, ZPL, and WebView
Communications	Configuration, ZPL, and WebView
Control Prefix	Configuration, ZPL, and WebView
Format Prefix	Configuration, ZPL, and WebView
Delimiter Character	Configuration, ZPL, and WebView
ZPL Mode	Configuration, ZPL, and WebView
Media Power Up	Configuration, ZPL, and WebView
Head Close	Configuration, ZPL, and WebView
Backfeed	Configuration, ZPL, and WebView
Label Top	Configuration, ZPL, and WebView
Left Position	Configuration, ZPL, and WebView
Head Resistance	Configuration (must match head resistance label value), ZPL, and WebView
Applicator Port	Configuration, ZPL, and WebView
Start Print Signal	Configuration, ZPL, and WebView
Resynch Mode	Configuration, ZPL, and WebView
Ribbon Low Mode	Configuration, ZPL, and WebView
Reprint Mode	Configuration, ZPL, and WebView
Web Sensor	Configuration, ZPL, and WebView
Media Sensor	Configuration, ZPL, and WebView
Ribbon Sensor	Configuration, ZPL, and WebView
Mark Sensor	Configuration, ZPL, and WebView
Mark Media Sensor	Configuration, ZPL, and WebView
Media LED	Configuration, ZPL, and WebView
Ribbon LED	Configuration, ZPL, and WebView
Mark LED	Configuration, ZPL, and WebView

Parameter	Controlled by
LCD Adjust	Configuration and WebView
Modes Enabled	ZPL and WebView
Modes Disabled	ZPL and WebView
Resolution	Fixed (head type switch)
Socket 1 ID	Fixed (option EPROMS)
Firmware	Fixed (code EPROMS)
Configuration	Configuration and WebView
Memory	Fixed (SIMM size and 1 MB standard)
B:Memory	Fixed (option card)
J12 Interface	Fixed
J11 Interface	Fixed
J10 Interface	Fixed
J9 Interface	Fixed
J8 Interface	Fixed
J7 Interface	Fixed

Communications Diagnostics Test

 **NOTE:** The following test cannot be performed until all configuration and calibration parameters have been set. For information, refer to “Configuration and Calibration Sequence” beginning on page 16.

This test is performed using the control panel. Refer to “Setting Communications Mode” on page 26. A typical printout from this test is shown in Figure 16.

 **NOTE:** This label is inverted when printed.

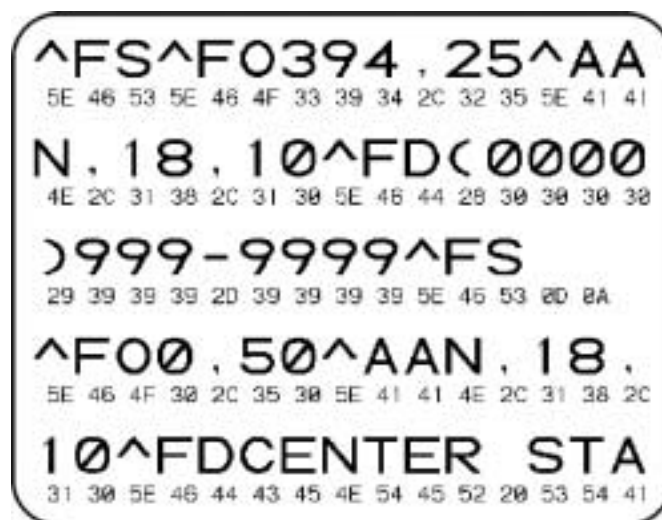


Figure 16. Results of Communications Diagnostics Test

Options

Your 116PAX3 print engine can be equipped with the following options. Contact your equipment supplier for further information and pricing.

Single In-line Memory Module (SIMM)

An optional 8 MByte SIMM increases the graphic and font storage capacity of the print engine and/or increases the print length. As this is volatile memory, contents are lost when the print engine is turned off.

Personal Computer Memory Card Interface Association (PCMCIA) Memory Card

The Type I or Type II PCMCIA memory card is used for graphic, font, and label format storage. This card is an 8 MByte, non-volatile memory device, so the contents are not lost when the print engine is turned off.

ZebraNet™ PrintServer II

Allows you to connect a Zebra print engine to your Ethernet network. Available for 10Base-T networks.

Remote Front Panel

Allows you to operate from the remote front panel from as far away as 25' (7 m). The Remote Front Panel is a factory-installed option. When installed, the front panel is removed from the front of the print engine.



Print Engine Specifications

Standard Features

• Left-hand and right-hand models	• Thermal transfer and direct thermal printing
• 600 dpi (24 dpmm): Programmable constant printing speeds (per second) of: 1" (25 mm), 2" (51 mm), 3" (76 mm), 4" (102 mm)	• Dual media sensors (transmissive is default)
• Full function Front Panel and multi-lingual backlit LCD; 180° rotatable	• Real-time clock
• Thin glaze printhead with E ³ Element Energy Control	• Advanced counter with firmware support for printhead cleaning

Physical Characteristics

Height	11.8" (300 mm)
Width	9.6" (244 mm)
Depth	17.8" (452 mm)
Weight	34.5 lbs. (15.6 kg)



NOTE: For installation information, refer to "Appendix B" on page 79.

Environmental Operating Range

Operating Temperature	
<i>Thermal transfer</i>	41° F to 104° F (5° C to 40° C)
<i>Direct thermal</i>	32° F to 104° F (0° C to 40° C)
Non-condensing relative humidity	
<i>Operation</i>	20% to 85%
<i>Storage</i>	5% to 85%
Storage temperature	-40° F to 140° F (-40° C to 60° C)

Printing Considerations

Media Type (continuous, die-cut, or black mark)	116PAX3
Resolution	600 dots per inch (24 dots per mm)
Dot size	0.0016" × 0.0016" (0.035 mm × 0.070 mm)
First dot location (from inside media edge)	0.093" ± 0.035" (2.4 mm ± 0.89 mm)
Maximum print width	3.2" (81.6 mm)
Maximum print length (with full width media)	
<i>Non-continuous</i> (4 MB Memory)	33" (838 mm)
<i>Non-continuous</i> (12 MB Memory)	33" (838 mm)
<i>Continuous</i> (4 MB Memory)	39" (990 mm)
<i>Continuous</i> (12 MB Memory)	123" (3124 mm)

Media Specifications

Media width (label and liner)	0.62" to 4.5" (13 mm to 114 mm)
Minimum label length <i>Applicator mode</i> <i>Rewind mode</i> <i>Tear-off mode</i>	0.5" (12.7 mm); 0.25" (6 mm) with backfeed off 0.25" (6 mm) 0.5" (12.7 mm); 0.25" (6 mm) with backfeed off
Registration tolerance (does not include label/liner position tolerances) <i>Vertical (concurrent labels)</i> <i>Horizontal</i>	$\leq \pm 0.020"$ (± 0.5 mm) (in Applicator mode) $\leq \pm 0.020"$ (± 0.5 mm)
Total thickness (including liner)	0.0058" to 0.010" (0.148 mm to 0.256 mm)
Interlabel Gap (Transmissive Sensor) <i>Minimum</i> <i>Preferred</i> <i>Maximum</i>	0.015" (2 mm) 0.118" (3 mm) Refer to page 19 for Maximum Label Length discussion.
Black Mark (Reflective Sensor) <i>Length</i> (parallel to inside media edge) <i>Width</i> (perpendicular to inside media edge)	0.12" to 0.43" (3 mm to 11 mm) $\geq 0.43"$ (≥ 11 mm)
Print Line to Peel Bar Distance	0.464" (11.8 mm)
Media Unwind Force	Applicator media supply steady-state tension must be uniform and must not exceed 2 lbs (1 kg). Start/Stop tension transients must not exceed 4 lbs (1.8 kg).
Media Rewind Force	Applicator media take-up pull tension must be uniform between 1 and 4 lbs (0.5 and 1.8 kg).

Media registration and minimum label length are affected by media type and width, ribbon type, and print speed. Performance improves as these factors are optimized. Zebra recommends always qualifying any application with thorough testing.

Ribbon Specifications

Width (wound coated side out)	1.0" to 4.5" (25.4 mm to 114 mm)
Standard length	2,952' (900 m) Note: Shorter lengths are accommodated.
Roll size <i>Inner core diameter/Maximum roll size</i>	1.0" (25.4 mm)/4.2" (107 mm)

Zebra Programming Language (ZPL II)

• Communicates in printable ASCII characters	• Format inversion (white on black)
• Controlled via mainframe, mini, or PC	• Mirror-image printing
• Downloadable graphics, scalable and bitmap fonts, label templates, and formats	• Four-position field rotation (normal—0°, 90°, 180°, 270°)
• Object copying between memory areas (RAM and PC memory card)	• Slew command
• Adjustable print cache	• Programmable label quantities with print and pause control
• Data compression	• Automatic serialization of fields
• Automatic memory allocation for "format while printing"	• User-programmable password
• Status messages to host upon request	

Bar Codes

<ul style="list-style-type: none"> Bar code modulus “X” dimensions: <ul style="list-style-type: none"> Picket fence (non-rotated) orientation: 0.0049” mil to 0.049” Ladder (rotated) orientation: 0.0049” mil to 0.049” 	<ul style="list-style-type: none"> Linear bar codes: Code 11, Code 39, Code 93, Code 128 with subsets A/B C and UCC Case Codes, ISBT-128, UPC-A, UPC-E, EAN-8, EAN-13, UPC and EAN 2 or 5 digit extensions, Plessey, Postnet, Standard 2 of 5, Industrial 2 of 5, Interleaved 2 of 5, LOGMARS, MSI, and Codabar
<ul style="list-style-type: none"> Bar code ratios: 2:1, 7:3, 5:2, and 3:1 	

Communications Specifications

<ul style="list-style-type: none"> Bi-Directional Centronics Parallel (36-pin connector) with IEEE 1284-compliant software protocol (standard)
<ul style="list-style-type: none"> High-speed serial interfaces: <ul style="list-style-type: none"> Serial RS-232C w/DTR hardware handshake via DB-25 connector (standard) Serial RS-422/485 via 2 or 4-wire w/XON/XOFF handshake on alternate pins of DB-25 connector (standard) Configurable baud rates between 110 and 57.6K baud with 7 or 8 data bits, standard parity, 1 or 2 stop bits, DTR/DSR, Xon/Xoff Fused +5 @ 500mA supplied at pin 9 of the DB-25 connector
<ul style="list-style-type: none"> ZebraNet™ PrintServer II MPS Ethernet network print server—10Base-T (optional)
<ul style="list-style-type: none"> Remote Front Panel interface with male DB-15S connector (factory-installed option)
<ul style="list-style-type: none"> Applicator interface with female DB-15 connector

Memory

<ul style="list-style-type: none"> 4 MByte RAM standard <i>Optional 8 MByte SIMM Option available for longer labels or additional storage of fonts, graphics, logos, and label formats.</i>
<ul style="list-style-type: none"> 4 MByte Resident Flash
<ul style="list-style-type: none"> Type II Series C & D PC Card Interface (memory only) standard <i>Optional 8 MByte PC Memory Card—available for additional storage of fonts, graphics, logos, templates, and label formats.</i> <i>Also available pre-programmed with optional and international scalable fonts.</i>
<ul style="list-style-type: none"> Additional fonts available on optional EPROMs

Electrical

<ul style="list-style-type: none"> Dual 32-bit RISC and CISC microprocessors
<ul style="list-style-type: none"> Universal Power Supply with power-factor correcting 90–264 VAC, 48–62 Hz
<ul style="list-style-type: none"> Power consumption: <i>Idle = 30 W</i> <i>Printing = 150 W (as measured using the PAUSE Key Self Test label)</i>
<ul style="list-style-type: none"> Agency approvals: UL 1950 3rd Edition; CSA 22.2 950-95; EN60950 (IE 950); FCC (Class A); Canadian DOC (Class A); EN55022 (CISPR) (Class A); EN 61000-6-2; EN 61000-3-2; EN 61000-3-3; EN60950 (IE 950); AS/NZS 3548; CNS-13438; VCCI

Fuses

- 5 Amp, 250 VAC, 5 × 20 mm IEC style, as supplied with the print engine

AC Power Cord Requirements

Refer to Figure 17. Since many areas of the world have specific power requirements, an AC Power Cord may not be included with your print engine. A power cord must be provided by you that meets your local electrical requirements.



WARNING: For personnel and equipment safety, always use a three-prong plug with an earth-ground connection to the AC Power Source.

AC Power Cord Specifications

- The overall length must be less than 9.8' (3 m).
- It must be rated for at least 5 Amp, 250 VAC.
- The chassis ground (earth) **must** be connected to ensure safety and reduce electromagnetic interference. This is done by the third wire (earth) in the power cord.
- The AC power plug and IEC 320 connector should bear the certification mark of at least one of the known international safety organizations shown in Figure 18.

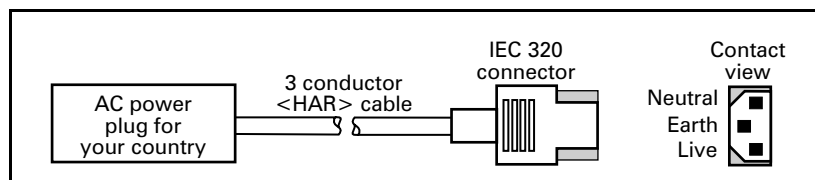


Figure 17. Power Cord

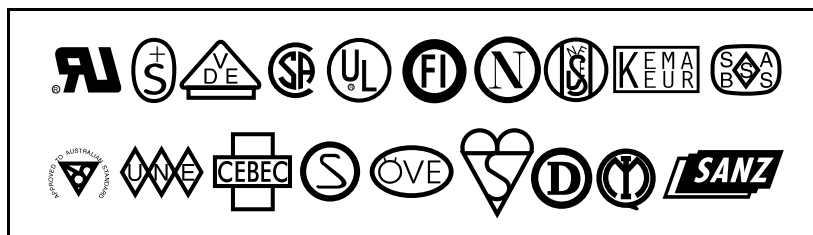


Figure 18. International Safety Organization Certifications

Power Fuse Replacement

The print engine uses a metric-style fuse (5 × 20 mm IEC) rated for 5 Amps at 250 Volts that bears the certification mark of a known international safety organization (see Figure 18).

The power entry module comes with two approved fuses in the fuse holder; one is “in-circuit” and one is provided as a “spare.”


To replace a fuse, follow this procedure and refer to Figure 19:



WARNING: Turn the AC power switch OFF and remove the power cord before performing this procedure.


1. Turn off the print engine and unplug the power cord from the back of the print engine.
2. Using a small-blade screwdriver, remove the fuse holder from the power entry module at the rear of the print engine.

3. Carefully remove the fuse from the “in circuit” location. To remove the fuse from the “spare” location, insert the point of a pencil through one of the two holes in the fuse holder; gently push. Repeat this procedure for the other hole.
4. Insert the spare fuse into the “in circuit” location. (Remember to replace an approved 250 VAC, 5 Amp fuse in the “spare” location!)

 **NOTE:** The spare fuse should be the exact type and rating as the original “in-circuit” fuse.

5. Reinstall the fuse holder into the power entry module at the rear of the print engine.
6. Reconnect the power cord and turn the print engine on.

The print engine should now be ready for operation and the POWER light should be on.

 **NOTE:** If power is not restored, an internal component failure may have occurred and the print engine requires servicing. Refer to “Troubleshooting” beginning on page 45.

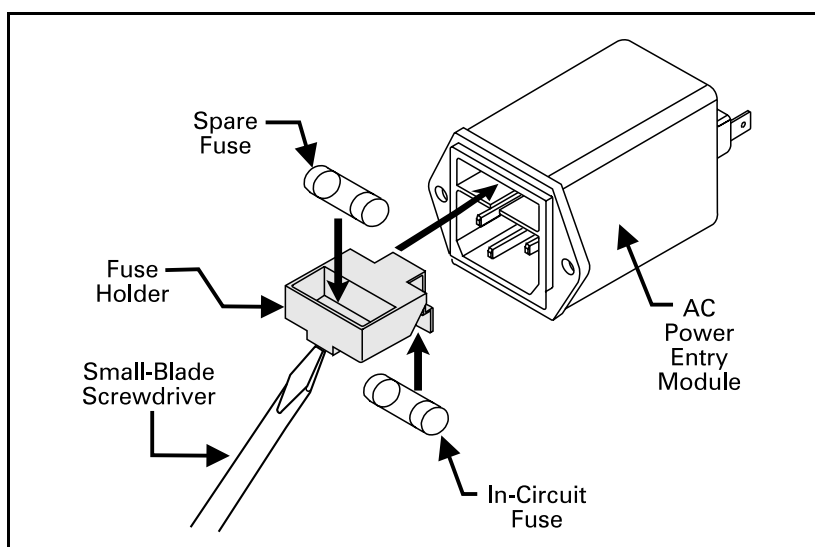


Figure 19. Installing a Fuse

Shipping



CAUTION: Never ship the print engine in any container other than the original packaging. Zebra will not be responsible for any damage that occurs during transit.

To ship the Zebra 116PAX3 print engine, remove all ribbon and media. Carefully pack the print engine in the original packing materials from the factory. A shipping container can be purchased from Zebra Technologies Corporation if the original packaging has been lost or destroyed. Contact your distributor or Zebra Technologies Corporation to order the 116PAX3 Packing Materials Kit (part # 43457M).



Warranty Information

Effective January 1, 1997

Printer Warranty

Zebra Technologies Corporation's (Zebra®) printers, excluding thermal printheads which are warranted separately below, are warranted against defects in material or workmanship for twelve (12) months from the date of original shipment by Zebra Technologies Corporation. This warranty does not cover normal wear and tear and shall be null and void if the equipment is modified, improperly installed or used, damaged by accident or neglect, or in the event any parts are improperly installed or replaced by the user.

Since printhead wear is part of normal operations, the original printhead and replacement printheads are covered by a limited warranty of six (6) months from the date of original shipment by Zebra Technologies Corporation. To qualify for this warranty, the printhead must be returned to the factory or other authorized service center. Although the user is not required to purchase Zebra brand supplies (media and/or ribbons), to the extent it is determined that the use of other supplies (media and/or ribbons) shall have caused any defect in the thermal printhead for which a warranty claim is made, the user shall be responsible for Zebra Technologies Corporation's customary charges for labor and materials to repair such defect. To the extent that it is determined that failure to follow the preventive maintenance schedule and procedures listed in the User's Guide shall have caused any defect in the thermal printhead for which a warranty claim is made, this limited warranty shall be void.

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Zebra Technologies Corporation
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Vernon Hills, Illinois 60061

Appendix A

Print Engine Communications Interface Technical Information

System Considerations

Communications Code—The print engine sends and receives American Standard Code for Information Interchange (ASCII). This code consists of 128 characters (256 for Code Page 850) including upper- and lower-case letters, numbers, punctuation marks, and various control codes.

Interfaces—The method of interfacing the print engine to a data source depends on the communication options installed in the print engine and the host. The standard interfaces are an RS-232/RS-422/RS-485 serial data port and an IEEE 1284 bi-directional parallel port. An Ethernet option is available for those applications that require them.

Data Specifications—When communicating via an asynchronous serial data port (RS-232/RS-422/RS-485), the baud rate, number of data and stop bits, the parity, and the XON/XOFF or DTR control are user-selectable and should be set to match those of the host computer. When communicating via the IEEE 1284 bi-directional parallel port, the previously mentioned parameters are not considered. Refer to “Configuration” beginning on page 15 to configure the communication parameters for the print engine.

Interface Considerations

RS-232—A serial communication method consisting of data and control signals; available as a standard feature on most PCs and other hosts.

Advantages: Cables and connectors are readily available from computer equipment stores and suppliers; easy to connect; two-way communication between the host and the print engine.

Disadvantages: Slower than the parallel connection; limited to 50' (15.24 m) of cable.

RS-422—A single-user current loop serial communication method.

Advantages: Longer cable length, up to 4000' (1219.2 m); greater immunity to data corruption caused by industrial motors and fluorescent lights; two-way communication between the host and the print engine.

Disadvantages: Not commonly available on standard PCs without additional hardware; slower than the parallel connection.

RS-485—A multiple-user current loop serial communication method that is used to support multiple print engines connected to a single host.

Advantages: Longer cable length, up to 4000' (1219.2 m); greater immunity to data corruption caused by industrial motors and fluorescent lights; two-way communication between the host and the print engine.

Disadvantages: Not commonly available on standard PCs without additional hardware; slower than the parallel connection.

IEEE 1284 Bi-directional Parallel—This is a common communication method available on most PCs and other hosts.

Advantages: Fastest of the four communication interfaces; cables and connectors are readily available from computer equipment stores and suppliers; two-way communication between the host and the print engine; easy to connect.

Disadvantages: Shorter recommended cable length of 6' (1.83 m); many computers are equipped with only one parallel port, allowing only one IEEE 1284 bi-directional device to be connected at a time.



WARNING: Connecting a data communications cable while the power is ON may damage the *PAX3* print engine.


RS-232/RS-422/RS-485 Serial Data Port

The connections for these standard interfaces are made through the DB-25 female connector on the rear panel. Refer to Table 2. For all RS-232 input and output signals, the print engine follows both the Electronics Industries Association (EIA) RS-232 and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24 standard signal level specifications.

Table 2. RS-232/RS-422/RS-485 Pinouts

PIN NO.	DESCRIPTION
1	Frame ground for cable shield
2	TXD (RS-232 transmit data) output from print engine
3	RXD (RS-232 receive data) input to print engine
4	RTS (RS-232 request to send) output from print engine
6	DSR (data set ready) input to print engine
7	Signal ground for RS-232
9	+5 VDC source output (750 mA maximum)
11	Signal ground reference for RS-422/RS-485
13	RS-422/RS-485 data input B (–)
14	RS-422/RS-485 data output B (–)
16	RS-422/RS-485 data input A (+)
19	RS-422/RS-485 data output A (+)
20	DTR (RS-232 data terminal ready) output from print engine
NOTE: Pins 5, 8, 10, 12, 15, 17, 18, and 21–25 are unused and unterminated.	

RS-232 Interconnections—The print engine is configured as Data Terminal Equipment (DTE). Figure 20 illustrates the connections required to interconnect the print engine with the standard 9-pin serial port connector on a PC. Figure 21 illustrates the internal connections of the print engine's RS-232 connector.

 **NOTE:** If using a 9-pin to 25-pin adapter plug attached to the computer, use a null modem cable between the adapter plug and the print engine. To connect the print engine to other DTE devices with DB-25 connectors (such as an optional serial port of a PC), an RS-232 null modem (crossover) cable should be used.

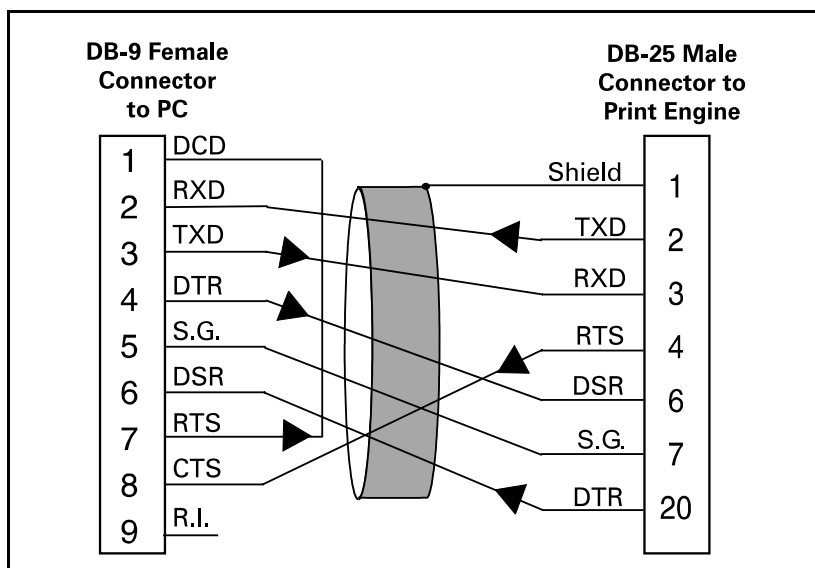


Figure 20. 9-Pin to 25-Pin Interconnecting Cable

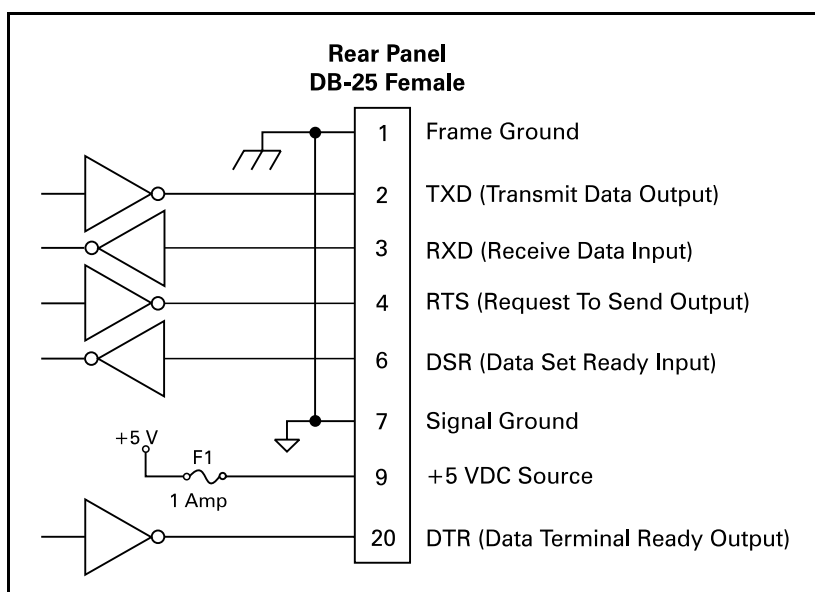


Figure 21. RS-232 Connections

RS-422/RS-485 Interconnections—The print engine may be connected to a host by an RS-422/RS-485 interface. The DB-25 Female connector on the rear of the print engine uses specific pins for this purpose. Figure 22 illustrates the required cable wiring for interconnecting to the print engine's DB-25 connector. Figure 23 illustrates the internal connections of the print engine's RS-422/RS-485 connector.

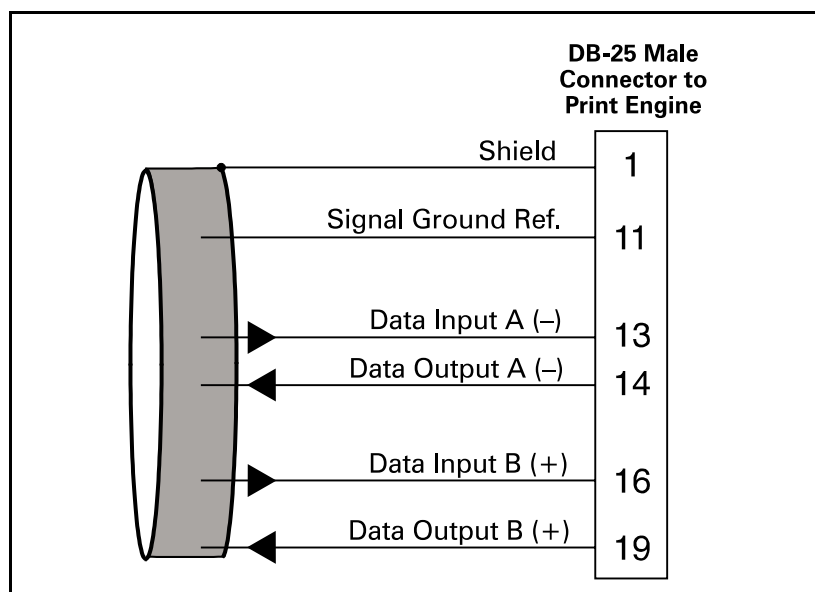


Figure 22. RS-422/RS-485 Interconnecting Cable

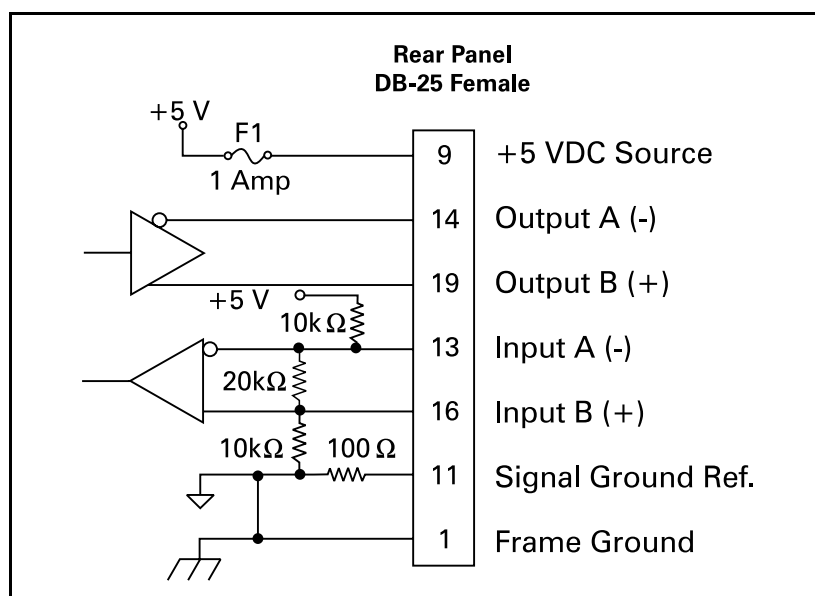


Figure 23. RS-422/RS-485 Connections

IEEE 1284 Bi-directional Parallel Data Port

A standard 36-pin IEEE bi-directional parallel connector is available at the rear of the print engine for connection to the data source.

Parallel Port Interconnections—Table 3 shows the pin configuration and function of a standard computer-to-print engine IEEE 1284 bi-directional parallel cable.


Table 3. IEEE 1284 Bi-directional Parallel Connector Pinouts


PIN NO.	DESCRIPTION
1	STROBE—The high-to-low transition of this input signal latches the data at the eight data inputs into the print engine.
2–9	DATA BITS 0–7—Parallel data inputs to the print engine. They have TTL input characteristics where a HIGH (+5 V) level corresponds with a logic 1 and a LOW (0 V) level is a logic 0.
10	ACKNOWLEDGE—This output of the print engine is an active LOW pulse, indicating that the print engine has received the previous character and is ready to accept another data character.
11	BUSY—This print engine output is active HIGH whenever it cannot accept data.
12	ERROR—This output signal is active HIGH whenever the print engine is out of paper or ribbon.
13	SELECT—The function of this output signal is determined by a Print Engine Configuration Option. In the default condition, SELECT is active HIGH whenever the parallel port is powered up and enabled.
14	AUTOFEED—This input is not used by the print engine.
15, 33, 34	Not used.
16, 19–30	SIGNAL GROUNDS—The logic GROUNDS and returns for all input and output signals.
17	Chassis ground (for cable shield connections).
18	+5 V fused output, 750 mA maximum
31	INITIALIZE (reset—This input is not used by the print engine).
32	FAULT—This output from the print engine is active LOW whenever any of the following error conditions are present: Printhead Open, Printhead Over Temperature, Paper Out, Ribbon Out, Rewind Full (if Rewind is used).
35	+5 V resistive
36	SEL IN—Connected but not used by the print engine.

Cabling Requirements

Data cables must be fully shielded and fitted with metal or metalized connector shells. Shielded cables and connectors are required to prevent radiation and reception of electrical noise. To minimize electrical noise pickup in the cable:

- Keep data cables as short as possible.
- Do not bundle the data cables tightly with the power cords.
- Do not tie the data cables to power wire conduits.

 **NOTE:** Print engines comply with FCC “Rules and Regulations,” Part 15, Subpart “J,” for Class “A” equipment, using fully shielded 6’ (2 m) data cables. Use of longer cables or unshielded cables may increase radiated emissions above the Class “A” limits.

 **NOTE:** RS-422 and RS-485 applications should use shielded twisted pairs with 120 ohm controlled impedance as recommended in the Appendix of the ITA/EIA-485 specification.

Applicator Interface Connector

Refer to Table 4. An external DB-15 connector is present on the rear panel of the print engine for communication with the applicator. An optional DB-15 to DB-9 adapter cable (part # 49609) is available to accommodate existing DB-9 interfaces. Figure 24 illustrates the cabling connection for print engines without the optional remote front panel, and Figure 25 illustrates the cabling connection for print engines with the optional remote front panel. The optional remote front panel comes complete with the cable and connector.

Table 4. DB-15 Connector (Print Engine to Applicator)

PIN #	SIGNAL NAME	SIGNAL TYPE	FUNCTIONAL DESCRIPTION
1	SIGNAL GROUND (+5V Return)	Ground	JP1 IN—Ground return for Internal +5V power source and is available here for remote opto-isolators, if required. (JP2 IN) JP1 OUT—Ground return for External +5V power source. (JP2 OUT)
2	+5V (Fused at 500 mA)	Power	JP2 IN—Internal +5V power source supplies power to internal opto-isolators and is available here for remote opto-isolators, if required. (JP1 IN) JP2 OUT—External +5V power source must be connected here to supply power to internal opto-isolators. (JP1 OUT)
3	START PRINT	Input	PULSE MODE—The label printing process begins on the HIGH to LOW transition of this signal if a format is ready. De-assert this signal HIGH to inhibit printing of a new label. LEVEL MODE—Assert LOW to enable the print engine to begin printing if a format is ready. The print engine prints new labels as long as the signal is asserted. When de-asserted, the label currently printing is completed and the print engine stops and waits for this input to be reasserted LOW.
4	FEED	Input	When the print engine is in an idle state or has been PAUSED, assert this input LOW to trigger repeated feeding of blank labels. De-assert HIGH to stop feeding blank labels and register to the top of the next label.

Table 4. DB-15 Connector (Print Engine to Applicator)—Continued

PIN #	SIGNAL NAME	SIGNAL TYPE	FUNCTIONAL DESCRIPTION
5	PAUSE	Input	To toggle the current PAUSE state, this input must be asserted LOW for 200 milliseconds, or until the SERVICE REQUIRED output (pin 10) changes state.
6	REPRINT	Input	If the REPRINT feature is enabled, this input must be asserted LOW to cause the print engine to reprint the last label. (See “Configuration and Calibration Sequence” beginning on page 16.) If the REPRINT feature is disabled, this input is ignored.
7	+28V (Fused at 500 mA)	Power	Interface Power Supply—Supplies power to external sensors as required.
8	POWER GROUND (+28V Return)	Ground	Interface Power Ground.
9	RIBBON LOW	Output	If the RIBBON LOW feature is enabled, and the amount of ribbon remaining on the supply spool is below a specific threshold level, this output is asserted HIGH. If the RIBBON LOW feature is disabled, this output lead is disabled. (See “Configuration and Calibration Sequence” beginning on page 16.)
10	SERVICE REQUIRED	Output	While either the media cover is open, the printhead is open, the ribbon is out, the media is out, the print engine is paused, or an operational fault has occurred, this output is asserted LOW. If the applicator RESYNCH mode is set to ERROR mode, this signal also asserts LOW for a RESYNCH error.
11	END PRINT	Output	OFF: Applicator Port OFF.
			MODE 1: Asserted LOW only while the print engine is moving the label forward; otherwise de-asserted HIGH.
			MODE 2: Asserted HIGH only while the print engine is moving the label forward; otherwise de-asserted LOW.
			MODE 3: (Default) Asserted LOW for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing.
			MODE 4: Asserted HIGH for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing.
12	MEDIA OUT	Output	Asserted LOW while there is no media in the print engine.
13	RIBBON OUT	Output	Asserted LOW while there is no ribbon in the print engine.
14	DATA_READY	Output	Asserted LOW when sufficient data has been received to begin printing the next label. De-asserted HIGH whenever printing stops after the current label, due to either a PAUSE condition or the absence of a label format.
15	CLEAN HEAD NOW	Output	Asserted LOW every time the advanced counter measures 150 meters (only resets upon a printhead open condition).

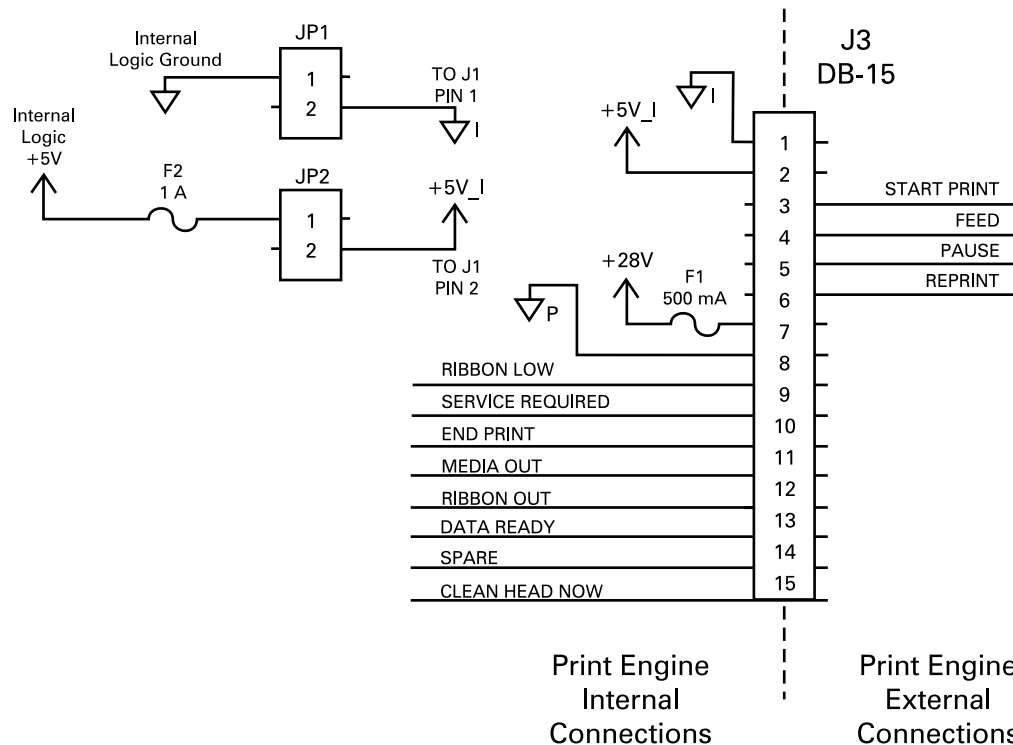
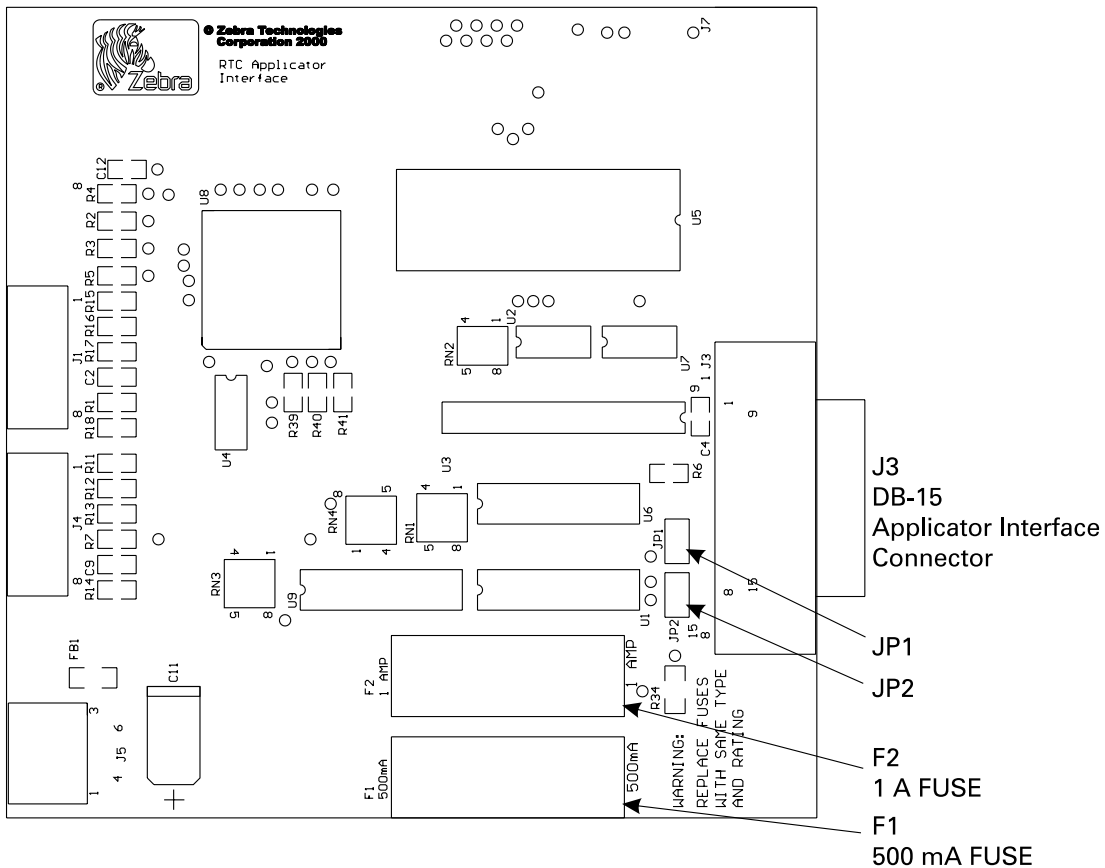


Figure 24. Applicator Interface Connections Without Optional Remote Front Panel

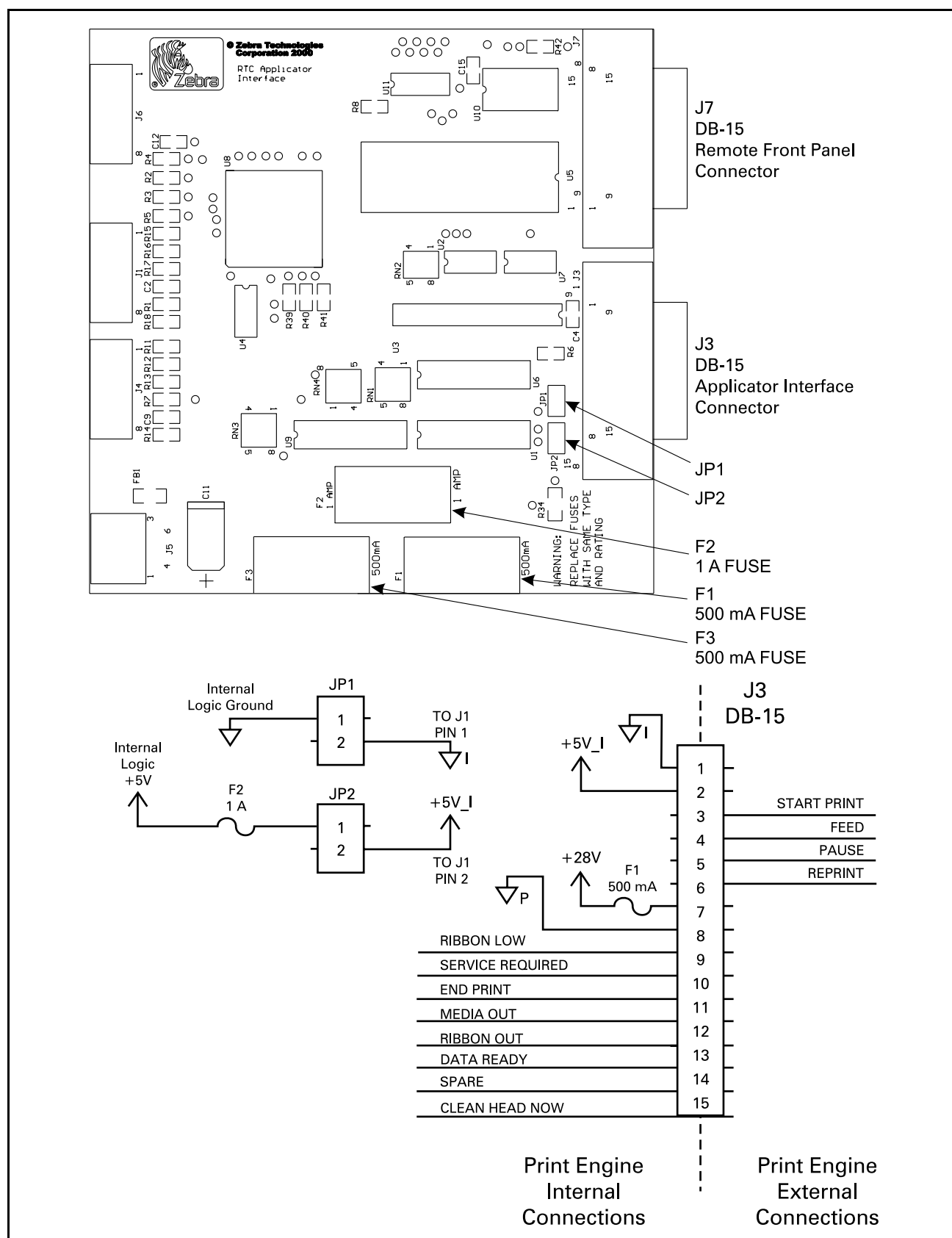


Figure 25. Applicator Interface Connections with Optional Remote Front Panel



Appendix B

Installation Information

Ventilation openings of the print engine mounting enclosure shall be provided by the installer to remove heat and ensure uninterrupted, trouble-free operation of the print engine. Ambient air temperature surrounding the print engine **must not exceed** 104° Fahrenheit or 40° Centigrade.

When the print engine is mounted, consideration must be given to the stability of the complete assembly so that when a full roll of media is loaded, the equipment does not become physically unstable.

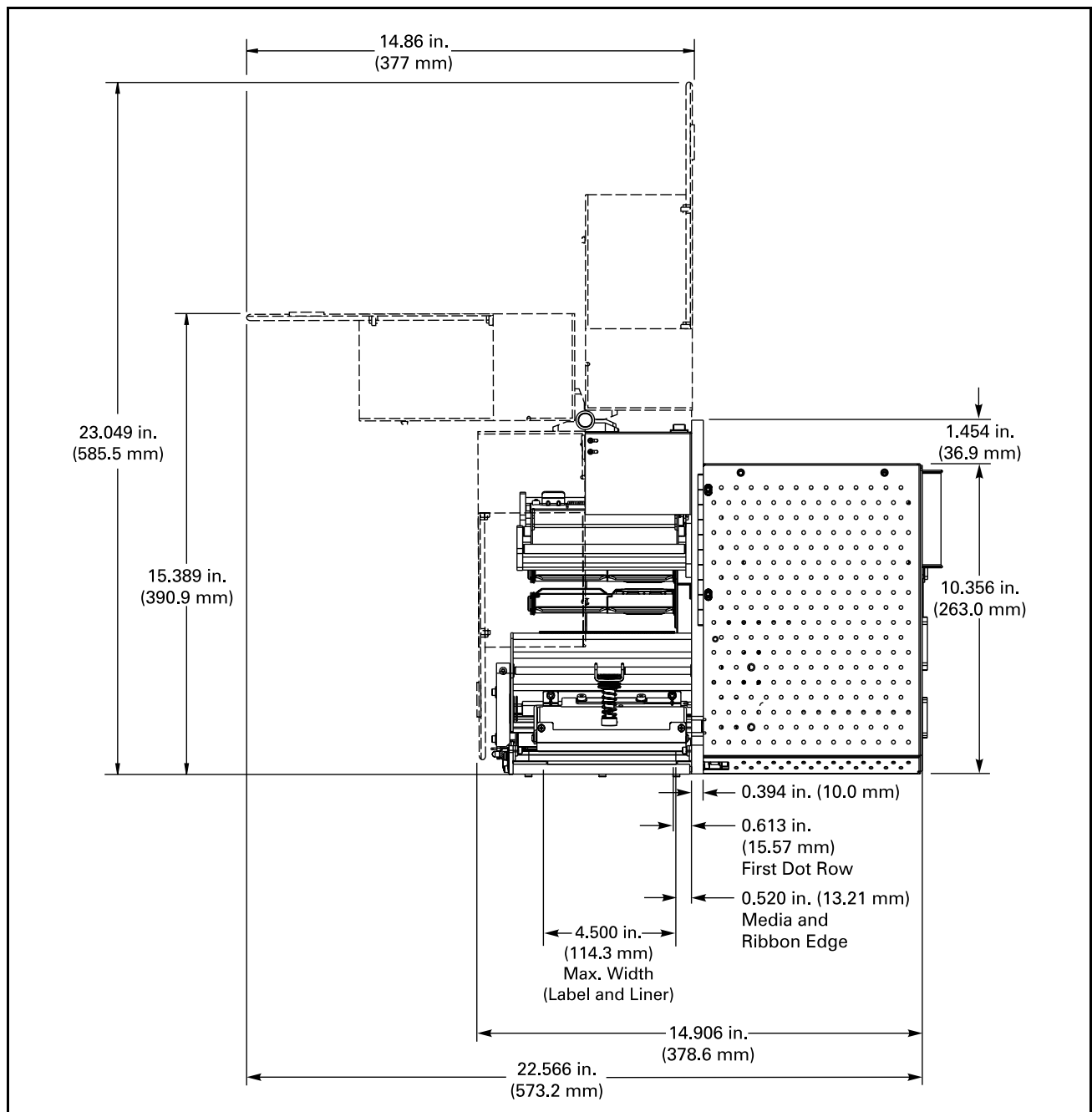


Figure 26. Right Side View of Print Engine (RH)

Consideration must be given to the current rating of the print engine during installation so that when power is applied to the print engine and the enclosing equipment, an overload condition is not effected on enclosing equipment circuits or supply wiring.

Reliable earthing of the print engine must be maintained. Particular attention must be given to the AC power supply connections so that earth ground is maintained through the AC power input connector.

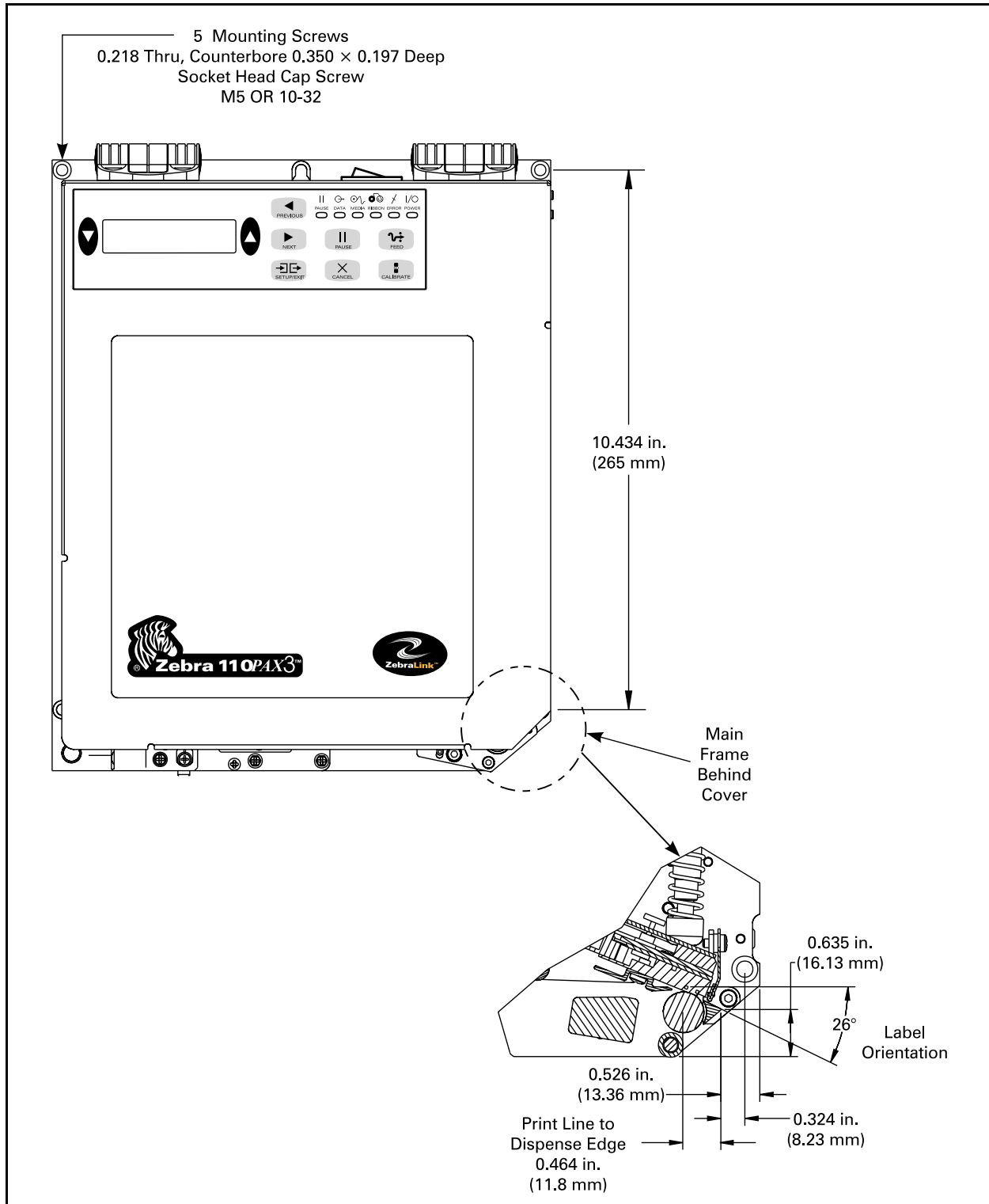



Figure 27. Front View of Print Engine (RH)

 **NOTE:** Mounting hole locations are identified for both the right-hand and left-hand print engines.

Clearance at the rear panel of the electronics enclosure must provide ample space for electronic connectors and dressing of the following cables: IEC power cord, serial and/or parallel host communication cable, optional host communication cable (Ethernet), and the discrete signal (applicator) interface cable.

The IEC power cord does not have a strain relief on the print engine. If the operating characteristics of the applicator include vibration or strain on the power cord, then the installation shall provide an appropriate clamping mechanism to avoid unintentional disconnection of the power cord from the print engine.

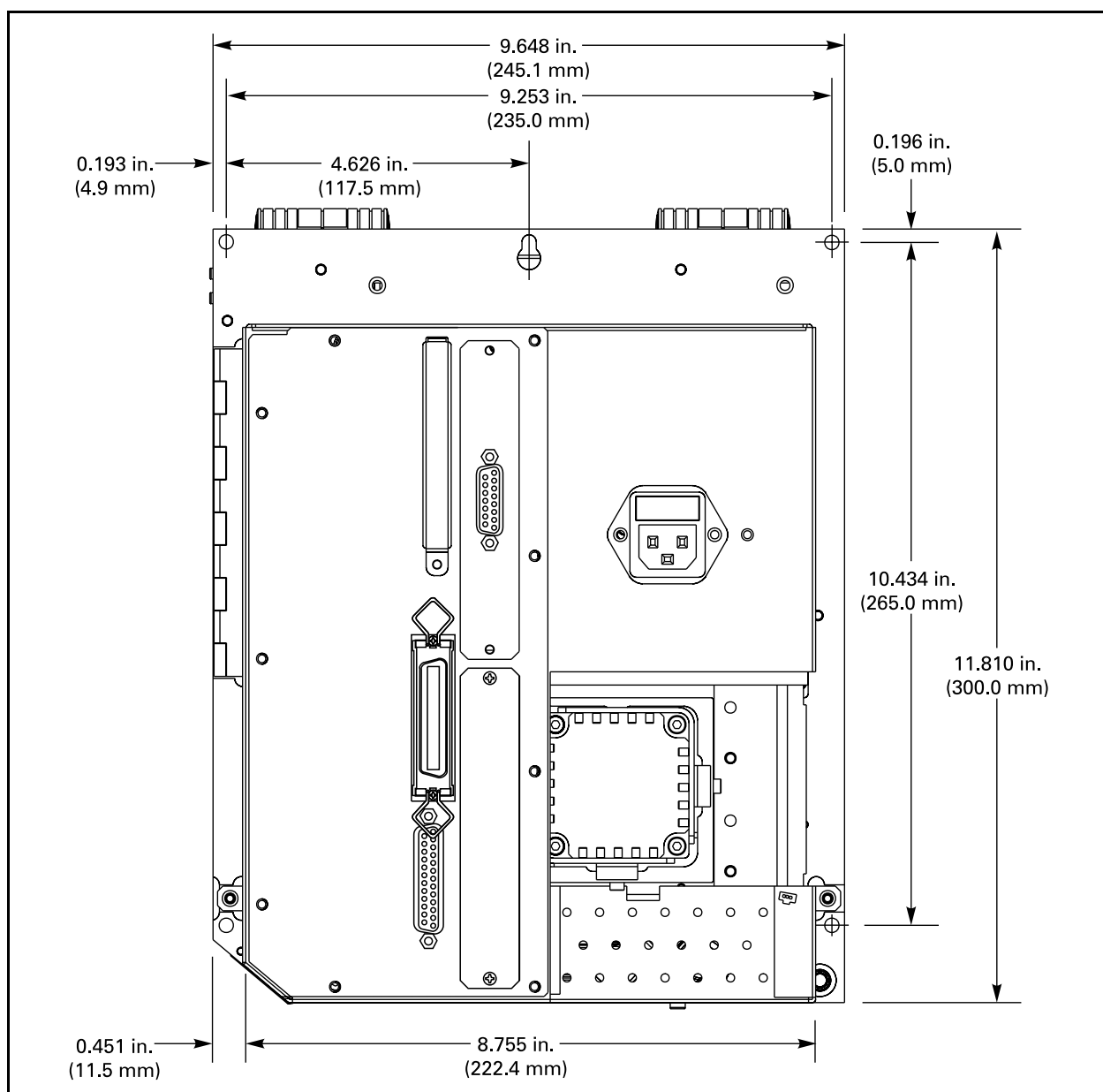


Figure 28. Rear View of Print Engine (RH)

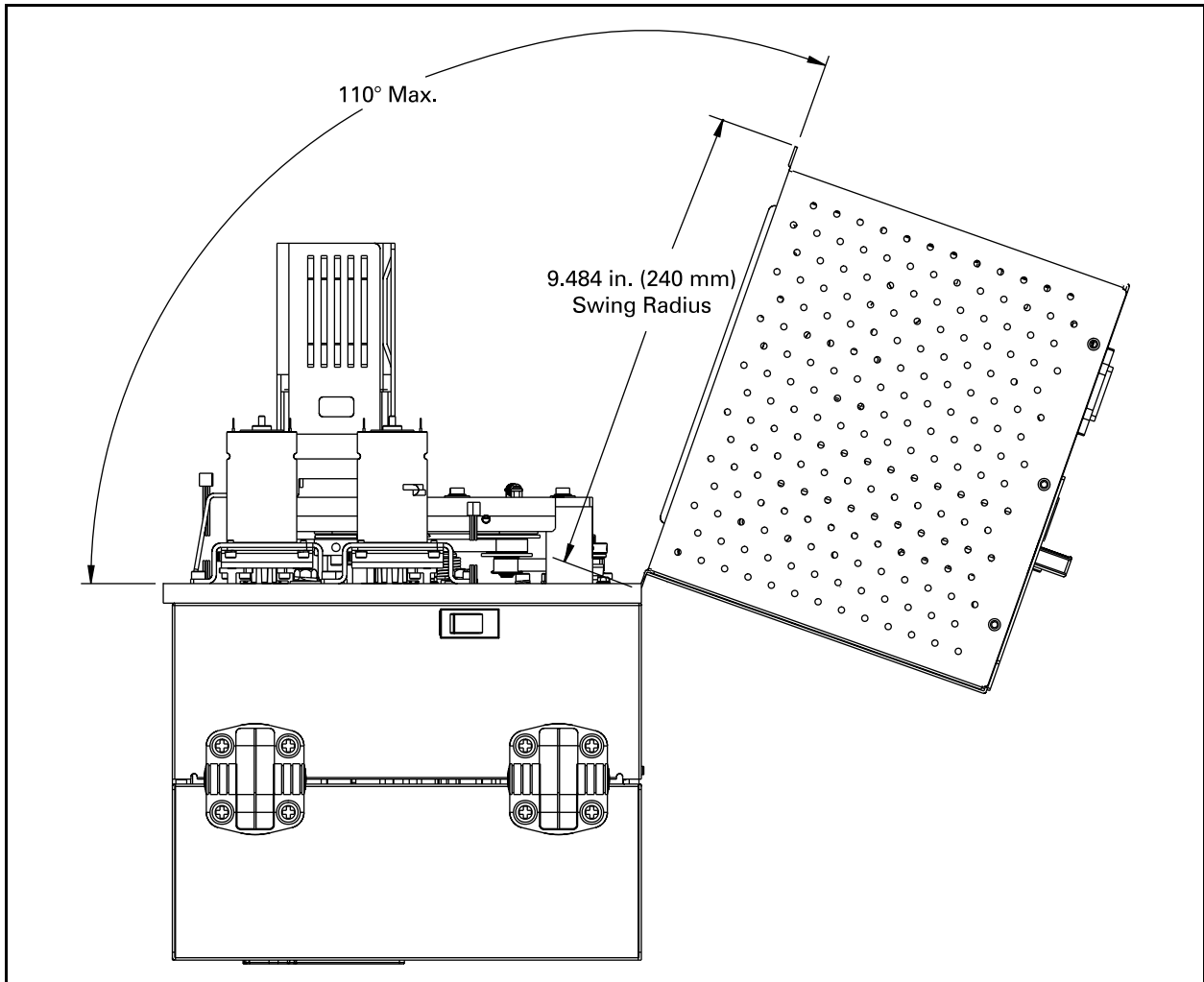


Figure 29. Top View of Print Engine (RH)

Glossary

Alphanumeric—Indicating letters, numerals, and characters such as punctuation marks.

Backfeed—When the print engine pulls the media and ribbon (if used) backward into the print engine so that the beginning of the label to be printed is properly positioned behind the printhead. Backfeed occurs when operating the print engine in tear-off and applicator mode.

Bar code—A code by which alphanumeric characters can be represented by a series of adjacent stripes of different widths. Many different code schemes exist, such as the universal product code (UPC) or Code 39.

Black mark—A registration mark found on the underside of the print media that acts as a start-of-label indication for the print engine. (See *continuous media*.)

Calibration (of a print engine)—A process in which the print engine determines some basic information needed to print accurately with a particular media and ribbon combination. To do this, the print engine feeds some media and ribbon (if used) through the print engine and senses whether to use the direct thermal or thermal transfer print method, and (if using non-continuous media) the length of individual labels or tags.

Character set—The set of all letters, numerals, punctuation marks, and other characters that can be expressed by a particular font or bar code.

Check digit—A character added to a bar code symbol that indicates to the scanner that it has read the symbol correctly.

Configuration—The print engine configuration is a group of operating parameters specific to the print engine application. Some parameters are user-selectable, while others are dependent on the installed options and mode of operation. Parameters may be switch-selectable, front panel programmable, or downloaded as ZPL II commands. A configuration label listing all the current print engine parameters may be printed for reference.

Continuous media—Label or tag-stock media that has no notch, gap, or web (media liner only) to separate the labels or tags. The media is one long piece of material.

Core diameter—The inside diameter of the cardboard core at the center of a roll of media or ribbon.

Diagnostics—Information about which print engine functions are not working that is used for troubleshooting print engine problems.

Die-cut media—A type of label stock that has individual labels stuck to a media liner. The labels may be either lined up against each other or separated by a small distance. Typically the material surrounding the labels has been removed. (See *non-continuous media*.)

Direct thermal—A printing method in which the printhead presses directly against the media. Heating the printhead elements causes a discoloration of the heat-sensitive coating on the media. By selectively heating the printhead elements as the media moves past, an image is printed onto the media. No ribbon is used with this printing method. Contrast this with *thermal transfer*.

Direct thermal media—Media that is coated with a substance that reacts to the application of direct heat from the printhead to produce an image.

Dynamic RAM—The memory devices used to store the label formats in electronic form while they are being printed. The amount of DRAM memory available in the print engine determines the maximum size and number of label formats that can be printed. This is volatile memory that loses the stored information when power is turned off.

Fanfold media—Media that comes folded in a rectangular stack. Contrast this with *roll media*.

Firmware—This is the term used to specify the print engine’s operating program. This program is downloaded to the print engine from a host computer and stored in FLASH memory. Each time the print engine power is turned on, this operating program starts. This program controls when to feed the media forward or backward and when to print a dot on the label stock.

Flash memory—FLASH memory is non-volatile and maintains the stored information intact when power is off. This memory area is used to store the print engine’s operating program. In addition, this memory can be used to store optional print engine fonts, graphic formats, and complete label formats.

Font—A complete set of alphanumeric characters in one style of type. Examples include CG Times™ and CG Triumvirate Bold Condensed™.

Ips “inches-per-second”—The speed at which the label or tag is printed. Zebra offers print engines that can print from 2 ips to 12 ips.

Label—An adhesive-backed piece of paper, plastic, or other material on which information is printed.

Label backing (label liner)—The material on which labels are affixed during manufacture that is discarded or recycled by the end-users.

Liquid crystal display (LCD)—The LCD is a back-lit display that provides the user with either operating status during normal operation or option menus when configuring the print engine to a specific application.

Light emitting diode (LED)—Indicators of specific print engine status conditions. Each LED is either off, on, or blinking, depending on the feature being monitored.

Lock-up—This is the term generally used to describe a fault condition that, for apparently no reason, causes the print engine to stop working.

Media—Material onto which data is printed by the print engine. Types of media include tag-stock, die-cut labels, continuous (with and without media liner), fanfold, and roll.

Media sensor—This sensor is located behind the printhead to detect the presence of media and, for non-continuous media, the position of the web, hole, or notch used to indicate the start of each label.

Media supply hanger—The stationary arm that supports the media roll.

Non-continuous media—Consumable printing stock that contains an indication of where one label/printed format ends and the next one begins. Examples are die-cut labels, notched tag-stock, and stock with black mark registration marks.

Non-volatile memory—Electronic memory that retains data even when the power to the print engine is turned off.

Notched media—A type of tag stock containing a cutout area that can be sensed as a start-of-label indicator by the print engine. This is typically a heavier, cardboard-like material that is either cut or torn away from the next tag. (See *non-continuous media*.)

Print speed—The speed at which printing occurs. For thermal transfer print engines, this speed is expressed in terms of ips (inches per second). Zebra offers print engines that can print from 2 ips to 12 ips.

Print engine configuration—See *configuration*.

Printhead wear—The degradation of the surface of the printhead and/or the print elements over time. Heat and abrasion can cause printhead wear. Therefore, to maximize the life of the printhead, use the lowest print darkness setting (sometimes called burn temperature or head temperature) and the lowest printhead pressure necessary to produce good print quality. In the thermal transfer printing method, use ribbon that is as wide or wider than the media to protect the printhead from the rough media surface.

Registration—Alignment of printing with respect to the top of a label or tag.

Ribbon—A band of material consisting of a base film coated with wax or resin “ink.” The inked side of the material is pressed by the printhead against the media. The ribbon transfers ink onto the media when heated by the small elements within the printhead. Zebra ribbons have a coating on the back that protects the printhead from wear.

Ribbon wrinkle—A wrinkling of the ribbon caused by improper alignment or improper printhead pressure. This wrinkle can cause voids in the print and/or the used ribbon to rewind unevenly. This condition should be corrected by performing adjustment procedures.

Roll media—Media that comes supplied rolled onto a core (usually cardboard). Contrast this with *fanfold media*.

Supplies—A general term for media and ribbon.

Symbology—The term generally used when referring to a bar code.

Tag—A type of media having no adhesive backing but featuring a hole or notch by which the tag can be hung on something. Tags are usually made of cardboard or other durable material.

Tear-off—A mode of operation in which the user tears the label or tag stock away from the remaining media by hand.

Thermal direct—See *direct thermal*.

Thermal transfer—A printing method in which the printhead presses an ink or resin coated ribbon against the media. Heating the printhead elements causes the ink or resin to transfer onto the media. By selectively heating the printhead elements as the media and ribbon move past, an image is printed onto the media. Contrast this with *direct thermal*.

Void—A space on which printing should have occurred, but did not because of an error condition such as wrinkled ribbon or faulty print elements. A void can cause a printed bar code symbol to be read incorrectly or not at all.



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